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THE

Saturday Magazine.

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THE AFGHANS.

NATIVES OF AFGHANISTAN.

> But not their joys alone thus coarsely flow,
> Their morals, like their pleasures, are but low;
> For, as refinement stops, from sire to son
> Unaltered, unimproved, the manners run;
> And love's and friendship's finely pointed dart
> Fall blunted from each indurated heart.
> Some sterner virtues o'er the mountain's breast
> May sit, like falcons, cowering on the nest;
> But all the gentler morals, such as play
> Through life's more cultured walks, and charm the way,
> These, far dispersed, on timorous pinions fly,
> To sport and flutter in a kinder sky.—GOLDSMITH.

THE inhabitants of mountain districts have in all ages been distinguished by a boldness of character and intrepidity of conduct which have rendered them formidable or admirable, according as the soft civilities of life have been neglected or cultivated. If these important considerations be laid aside, we find that the habits and customs of men are greatly, if not altogether, influenced by the nature of the soil and climate which they inhabit. The rugged and intrepid mountaineer derives his character from that of his native hills: the warm and luxurious plains of the south impart indolence and inactivity: the cold and barren scenes of the north produce a brisk and persevering energy.

If the reader will consult the map of Asia, he will find Afghanistan, a kingdom of considerable magnitude, between Persia and Hindostan. Its eastern boundary is the river Indus. It is bounded on the north by an extensive chain of snow-clad mountains, called Hindoo Koosh and the Paropamisan range*; on the west by Persia, with HERAT for its frontier town; and south by Beloochistan. It is situated between the twenty-ninth and thirty-sixth degrees of northern latitude, and the sixty-first and seventy-first of eastern longitude. This country is peculiarly interesting at the present time, as being the seat of war between the Persians, favoured by the Russians, on one side, and the Afghans, assisted by the combined forces of Runjeet Singh and the British, on the other. The reader will probably remember that on a former occasion we gave an account of that extraordinary individual, Runjeet Singh, whose name and character have been for several weeks past objects of public interest in our journals†

It is not of course our object to enter into the political question which at present agitates the Afghans. We

* The elevation of the mountains of Hindoo Koosh seems to be greater than that of the Andes. One of the peaks of this range has been estimated by Lieutenant Macartney at 20,493 feet above the level of the sea. The Hon. M. Elphinstone found no diminution of snow on this lofty range in the month of June, although in the neighbouring plain of Peshawer the thermometer marked a temperature of 113° in the shade.

† See *Saturday Magazine*, Vol XII., p. 239.

propose to furnish a few interesting details respecting them as a nation: the only remark necessary to be offered, is that, for the safety and stability of the British dominions in India, it has been deemed advisable by the British government in the east to lend assistance to the Afghans in repelling the incursions of their invaders.

Some writers refer the origin of the Afghans to the Israelites, some to the Egyptians; but the more general opinion is that they are derived from the Hun and Scythian tribes, who in former times were compelled, by migration or conquest, to seek a new abode; and who gradually settled in the mountain districts between Persia and Hindostan; a country in which they were not likely to be molested, on account of the sterility of the soil and the coldness of the clime. They collected originally in *toomans* or clans, which continue to the present day. Many of their chiefs are celebrated in oriental history. In the tenth century, the north-eastern part of the empire was conquered by a Khorassan chief; but the Afghans themselves remained independent in their mountain fastnesses. The family of this chief held the kingdom for two hundred years; but in 1159 the Afghans reconquered the country, and burned the capital of the usurper. They were afterwards attacked by Jenghis Khan, and the Mongol dynasty long occupied the plains, while the Afghans kept to the mountains. From 1405, after the death of Tamerlane, the Afghans enjoyed a long peace till 1506, when they were attacked by Baber. The plains of Afghanistan were as usual conquered; but the Afghans themselves remained secure, by again resorting to the mountains. In 1707 the Afghans became the assailants, conquered Persia, and founded an empire which endured but a brief space; for the celebrated Nadir Shah of Persia overthrew it, conquered the Afghans, and included their kingdom in his own. The life and exploits of Nadir have been made the subject of an excellent historical novel, by Mr. Fraser, called the *Kuzzilbash*. On the death of Nadir in 1747, an officer of the Afghan troop in the service of Persia, Ahmed Shah by name, returned to his own country, declared its independence, and founded the present monarchy. After the death of Ahmed the kingdom became a prey to internal dissension. Runjeet Singh seized several of its finest provinces, which he still retains, and defends by means of a large and well-disciplined army, under the management and direction of General Allard*.

The population of Afghanistan includes Afghans, Tartars, Belooches, and Persians, amounting in all to about eight millions; one half of which number, the Hon. Mountstuart Elphinstone thinks, includes AFGHANS.

Although situated so near the Hindoos, the Afghans differ altogether from that people. Their features are harsh, and strongly marked. Their faces bronzed by the sun; their hair and beards long and uncut; their rude dresses of skins, all present striking differences between them and their Hindoo neighbours. The arts of life are less cultivated; the luxuries of Hindostan unknown; and justice is administered in a ruder and more primitive manner than among the Hindoos. But rough and unpolished as the Afghans may appear, they possess a proud martial spirit, a devoted attachment to their own wild liberty, a love of sobriety and of hospitality, and a general contempt for indolence and pleasure, which make them appear in a far more favourable light than the weak and treacherous Hindoos.

The religion of the Afghans is strictly Mohammedan, but they tolerate other doctrines. No provision is made for the maintenance of their *mollahs*, or religious doctors; but this neglect is common in Mohammedan states. Their mollahs are supported by individual donation, by salary or occasional gifts, and sometimes by religious foundations. These mollahs form a united body, called *ulema*, into which new members are admitted after a due course of study and strict examination. They are numerous, and often hesitate not to assert their rights by an appeal to arms; in which case they assemble in numbers often amounting to 3000; and although no match for the Afghan warriors in arms, yet they generally gain their point by their spiritual influence over the multitude.

The chiefs of the Afghan clans are not hereditary. Each chief, or *khaun*, is generally appointed by the king, but sometimes by the people. He is selected from the oldest family of the tribe, with a certain regard for age, character, and experience. The choice is often difficult, from the number of contending candidates, and generally not accomplished without bloodshed. The meetings of the *ooloos*, or tribes, are called *jeergas*: each khaun holds his own jeerga, formed from the principal branches of his clan. Most decisions receive the consent of the whole clan, unless in matters of sudden emergency, when the chief may at once decide. One principal object of these meetings is the administration of justice, founded upon a rude and simple code, and regulated by the Koran. This code is called *pooshtoomvullee*, the first principle of which is, that all crimes are to be regarded as injuries to the persons only who suffer by them; and the object of the law is either to obtain compensation for the injury to the injured, or to regulate the amount of retaliation on the part of the latter. It is deemed honourable for an individual to redress his wrongs by private revenge; but if he exceed the measure thereof, he is amenable to the state. Among some of the tribes, however, a more justifiable system is gaining ground.

Criminal trials are conducted before a jeerga, at which Mohammedan lawyers, called *moollahs*, are allowed to plead. The proceedings are opened with prayers: a Pooshtoo verse is then repeated, announcing that, although events are in the hands of Allah, man is allowed to deliberate. Since most crimes consist of acts of violence committed according to the allowed principle of revenge, the act is generally admitted. The jeerga has to decide upon its legality. There are certain grave forms, and a rude, but highly-admired species of eloquence practised, and Mr. Elphinstone says that the decisions are usually impartial, if not just. The mode of compensation is a very odd one; to understand which we must go into a few apparently irrelevant details.

Although polygamy is allowed, yet the females are not subjected to that seclusion which prevails in most Mohammedan states. Hence the female sex is not so much degraded in this country as elsewhere in the east. But to every woman is attached a certain marketable value; and although attachments between the sexes are frequent, yet no man is allowed to marry until he has earned the purchase-money of his mistress. To do this is often attended with delays and difficulties, which impart a romantic cast to the affair, and form the theme of many a wild Afghan tale and song. When a man is sentenced to penal infliction, his sentence is to deliver to the family of the complainant a certain number of young women, who become part and parcel of the property of the injured man, and may be sold as such by him. Twelve is the usual number of young women to be awarded in case of murder, six with portions, and six without; the usual portion amounting to between seven and

* See *Saturday Magazine*, before quoted.

eight pounds sterling. For cutting off a hand, an ear, or a nose, six women; for breaking a tooth, three for a wound in the head, one. If the complainant consent, the defendant may pay the value of the women in money or goods.

The Afghans are fond of robust sports and athletic exercises. They are devotedly attached to hunting in all its forms; some of which are peculiar to themselves. One mode is, to form a large circle, and drive all the game up to a central point, where it is slain. The *attum* is a violent noisy dance, in which both sexes delight. Playing at marbles, hopping, jumping, &c., are favourite games; and as they delight in feasts and convivial enjoyments, they generally play for a feast, and the loser has to entertain the conqueror. They often pit cocks, quails, and other animals against each other, for a similar stake.

With all the wildness and turbulence of a young and free nation, the Afghans are nevertheless as active in mind as in body. They delight in stories and tales, especially the rude poetry of their warrior-chiefs, which celebrates the exploits of the clan. The reading of poetry is a distinct occupation in many of the towns. They possess few works that are more than a century and a half old; and all of them are said to be imitations of the Persian writers. It happens unfortunately that the Afghans regard the Persians as heretics, and will not resort to Persian colleges and schools. Their own schools are numerous, and they teach the rudiments of oriental learning, which is widely diffused. Their language is peculiar: it is called *pushtoo*.

The Afghans venerate birth and long descent: no man is considered a true Afghan who cannot trace his origin through at least six generations. Hence every man is provided with a long list of ancestors, whose mighty deeds he dwells upon with great complacency.

These people are devotedly attached to the pastoral life. One division dwells in houses; another in tents. They shrink from the exercise of trade and manual labour; and regard those who exercise it with contempt. The fixed habitations of the lower orders of Afghans are rudely built with unburnt bricks, and roofed with wood. The palaces of the higher orders are on the Persian model, though inferior: their chief ornaments are all Persian.

The Afghan costume is peculiar. It consists of close tunics, and wide mantles of sheepskin, or coarse woollen cloth, for the lower ranks, and velvet, silk, and fine shawl-cloth for the higher. Boots are everywhere worn; and it is considered as a mark of disrespect to their associates to appear without them. The dress of the ladies consists of jackets and pantaloons, both of velvet, silk, or shawl-cloth. Gold and silver ornaments, as well as precious stones, are not uncommon.

Their food is simple, consisting chiefly of *pilaus* of mutton and broth: their drink is butter-milk or sherbet. They also use tobacco. Fruit and vegetables are remarkably cheap among them; and in the absence of animal food, the consumption is great among the lower orders. When a sheep is slaughtered it is usual for its owner to make a feast among his neighbours and friends; and the guests are often valued in proportion to their story-telling abilities. The diet of the rich is chiefly an imitation of that of the Persian nobility, where the food, often ornamented with gold and silver leaf, is presented on trays of the same material.

In conclusion, we may observe that the Afghans are so named by the Persians. Their national name is ALKAI, and they will own no other. The Hindoos call them PATANS.

ILLUSTRATIONS OF THE BIBLE FROM THE MONUMENTS OF ANTIQUITY. No. XX.

ALTARS AND INCENSE.

THE altar of sacrifice was generally of a cubical form among the Jews and Egyptians. We have already given an engraving* of the form in which the bloody sacrifice was offered to the deity, bearing testimony to the great extension of that mighty and important truth which Natural Religion could never have discovered, "without shedding of blood, there is no remission of sin." In this kind of sacrifice a portion of the blood was necessarily sprinkled upon the altar; it thus became hallowed, and we find that it was used in the form of consecration prescribed for the high priests under the Levitical law.

And thou shalt take of the blood that is upon the altar, and of the anointing oil, and sprinkle it upon Aaron, and upon his garments, and upon his sons, and upon the garments of his sons with him: and he shall be hallowed, and his garments, and his sons, and his sons' garments with him. (Exod. xxix. 21.)

In the Levitical law we find that great importance is ascribed to the actual sprinkling of the blood upon the altar; for that law was designed constantly to remind the chosen people of the blood of that Great Atonement which was to be made once for all on Calvary, to expiate the sins of mankind.

The life of the flesh is in the blood: and I have given it to you upon the altar to make an atonement for your souls: for it is the blood that maketh an atonement for the soul. (Lev. xvii. 11.)

The burnt offering, or holocaust, was different from the bloody sacrifice; it was not expiatory, but an act of homage or gratitude, as appears from the directions given at the consecration of Aaron.

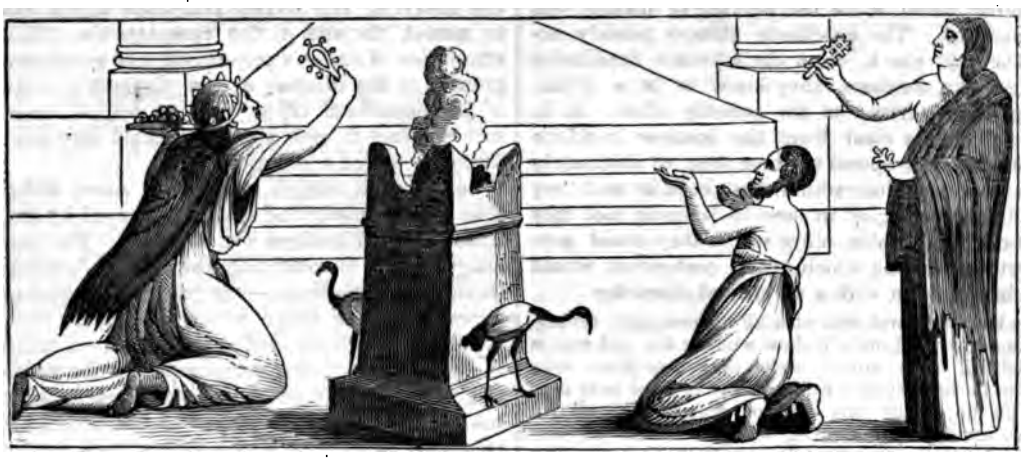
Thou shalt also take one ram; and Aaron and his sons shall put their hands upon the head of the ram. And thou shalt slay the ram, and thou shalt take his blood, and sprinkle it round about upon the altar. And thou shalt cut the ram in pieces, and wash the inwards of him, and his legs, and put them unto his pieces, and unto his head. And thou shalt burn the whole ram upon the altar: it is a burnt offering unto the Lord: it is a sweet savour, an offering made by fire unto the Lord. (Exod. xxix. 15—18.)

The act of homage is clearly distinguished from the act of expiation, in the sacrifice prescribed for rulers who had been guilty of an involuntary crime.

When a ruler hath sinned, and done somewhat through ignorance against any of the commandments of the Lord his God concerning things which should not be done, and is guilty; or if his sin, wherein he hath sinned, come to his knowledge; he shall bring his offering, a kid of the goats, a male without blemish: and he shall lay his hand upon the head of the goat, and kill it in the place where they kill the burnt offering before the Lord: it is a sin offering. And the priest shall take of the blood of the sin offering with his finger, and put it upon the horns of the altar of burnt offering, and shall pour out his blood at the bottom of the altar of burnt offering. And he shall burn all his fat upon the altar, as the fat of the sacrifice of peace offerings: and the priest shall make an atonement for him as concerning his sin, and it shall be forgiven him. (Lev. iv. 22—26.)

It is of importance to observe that this distinction between the bloody sacrifice and the burnt offering which is so clearly made in the law revealed by Moses; and which so forcibly intimates that the former was the type of some future great and consummating sacrifice, is not found in the ritual of any heathen nation. In the contest between Elijah and the priests of Baal, the latter confounded the two together, for they shed their own blood round about the altar they had erected to their pretended deity, when they found that prayers were of no avail.

* See *Saturday Magazine*, Vol. XIII., p. 149.



ANCIENT ALTAR.

Elijah said unto the prophets of Baal, Choose you one bullock for yourselves, and dress it first; for ye are many; and call on the name of your gods, but put no fire under. And they took the bullock which was given them, and they dressed it, and called on the name of Baal from morning even until noon, saying, O Baal, hear us. But there was no voice, nor any that answered. And they leaped upon the altar which was made. And it came to pass at noon, that Elijah mocked them, and said, Cry aloud: for he is a god; either he is talking, or he is pursuing, or he is in a journey, or peradventure he sleepeth, and must be awaked. And they cried aloud, and cut themselves after their manner with knives and lancets, till the blood gushed out upon them. (1 Kings xviii. 25—28.)

The altar of burnt offering differed in shape from the simple sacrificial altar; the latter, as we have seen, was of stone, unwrought by human hands, but the former was commanded by Moses to be made simply of earth.

An altar of earth thou shalt make unto me, and shalt sacrifice thereon thy burnt offerings, and thy peace offerings, thy sheep, and thine oxen: in all places where I record my name I will come unto thee, and I will bless thee. (Exod. xx. 24.)

The altar of burnt offerings erected by Solomon in the court of the temple was brasen, and of great capacity, but it was insufficient for the great sacrifice which was offered at the solemn dedication of the temple.

Solomon offered a sacrifice of peace offerings, which he offered unto the Lord, two and twenty thousand oxen, and an hundred and twenty thousand sheep. So the king and all the children of Israel dedicated the house of the Lord. The same day did the king hallow the middle of the court that was before the house of the Lord: for there he offered burnt offerings, and meat offerings, and the fat of the peace offerings: because the brasen altar that was before the Lord was too little to receive the burnt offerings, and meat offerings, and the fat of the peace offerings. (1 Kings viii. 63, 64.)

Differing in many respects from those we have described, was the altar of burnt offering, for the construction of which Moses gave the most precise and particular directions, because it was always to accompany the tabernacle.

And thou shalt make an altar of shittim wood, five cubits long, and five cubits broad; the altar shall be four square: and the height thereof shall be three cubits. And thou shalt make the horns of it upon the four corners thereof: his horns shall be of the same: and thou shalt overlay it with brass. And thou shalt make his pans to receive his ashes, and his shovels, and his basons, and his fleshhooks, and his fire-pans: all the vessels thereof thou shalt make of brass. And thou shalt make for it a grate of network of brass; and upon the net shalt thou make four brasen rings in the four corners thereof. And thou shalt put it under the compass of the altar beneath, that the net may be even to the midst of the altar. And thou shalt make staves for the altar, staves of shittim wood, and overlay them with brass. And the staves shall be put into the rings, and the staves shall be upon the two sides of the altar, to bear it. Hollow with boards shalt thou make it: as it was showed thee in the mount, so shall they make it. (Exod. xxvii. 1—8.)

This altar was to be for the burnt offerings of the nation, but that of earth was probably permitted for the use of separate tribes and private families. Indeed, one of the most signal marks of the divine wisdom which dictated the law to Moses, is that he has made provision in his ritual not only for the nomade state of the Israelites, collected into one congregation while wandering in the desert; but also for the very different condition in which they would be when settled in the Promised Land. Utterly inconsistent as the two states of society are, we find that ample directions are given for both conditions of the Jewish polity; it is inconceivable that human reason could have sufficed to accomplish this double task, and we must therefore humbly recognise in it proofs of "the wisdom which cometh from above."

The altar of incense differed from the altar of burnt offerings in its dimensions and its covering; it was only one cubit in breadth, and two cubits in height, and it was overlaid with pure gold instead of brass. The inferior priests, and in some cases the heads of families, were permitted to make sacrifices and offerings, but among both the Egyptians and the Jews, the privilege of burning incense was reserved for priests of high rank. The Egyptian priests engaged in this task are generally represented as wearing a leopard's skin, to which, from various indications on the monuments, we are led to conclude that peculiar sanctity was attached. However that may be, it is perfectly clear from all the records, both pictorial and historical, that greater importance belonged to this solemn act of homage, the offering of incense, than to any other function of the sacerdotal office. It was on account of the reservation of this privilege to Aaron, that Korah, Dathan, and Abiram, rebelled against Moses, and accused him of claiming exclusive sanctity for himself and his brother.

They rose up before Moses, with certain of the children of Israel, two hundred and fifty princes of the assembly, famous in the congregation, men of renown: and they gathered themselves together against Moses and against Aaron, and said unto them, Ye take too much upon you, seeing all the congregation are holy, every one of them, and the Lord is among them: wherefore then lift ye up yourselves above the congregation of the Lord? (Numbers xvi. 2, 3.)

Moses was struck with consternation at their impiety, but he finally consented to the test which they had so madly demanded. He permitted them to perform the act of homage which had been expressly

reserved for Aaron, when the offering of incense was first instituted. The rebellious princes readily accepted the test, which, from their former familiarity with Egyptian customs, they knew to be a distinguishing characteristic of the priestly office. It is, indeed, sufficiently clear, from the manner in which Moses made the proposal to these men, so obstinately bent on their own destruction, that both he and they regarded the offering of incense to Jehovah, not only as the most honourable office which they could perform, but also as one which, when performed, would at once invest them with a sacerdotal character.

He spake unto Korah and unto all his company, saying, Even to-morrow the Lord will show who are his, and who is holy; and will cause him to come near unto him: even him whom he hath chosen will he cause to come near unto him. This do; Take you censers, Korah, and all his company; and put fire therein, and put incense in them before the Lord to-morrow: and it shall be that the man whom the Lord doth choose, he shall be holy. (Numbers xvi. 5—7.)

From this part of the narrative it is abundantly evident that the rebellion of Korah and his company was not simply an insurrection against Moses, but a direct act of treason against the Majesty of the Omnipotent. They not only insulted the vicegerent whom Jehovah had selected to lead his chosen people, but they attempted to destroy the entire constitution established amidst the thunderings and lightnings of Sinai, by overthrowing the hereditary priesthood of the sons of Levi. Their audacious efforts were not directed against an isolated part of the system of polity which God had appointed for the Israelites, but against the key-stone of the whole, which, once removed, would precipitate the entire edifice into ruins. It is necessary to take the full view of their crime, to calculate all its bearings and extent, in order to form any accurate notion of their daring impiety. Their fearful punishment need not be related: in the words of the Psalmist,—

The earth opened and swallowed up Dathan, and covered the company of Abiram. And a fire was kindled in their company; the flame burned up the wicked. (Psalm cvi. 17, 18.)

But the importance of the function of offering incense was still further attested by the ordinance for commemorating this awful event, and perpetuating the remembrance of the dreadful punishment which had overtaken daring rebellion and audacious impiety. This commemoration is, indeed, one of the strongest attestations of the sanctity required for the performance of this act of homage.

And the Lord spake unto Moses, saying, Speak unto Eleazar the son of Aaron the priest, that he take up the censers out of the burning, and scatter thou the fire yonder; for they are hallowed. The censers of these sinners against their own souls, let them make them broad plates for a covering of the altar: for they offered them before the Lord, therefore they are hallowed: and they shall be a sign unto the children of Israel. And Eleazar the priest took the brasen censers, wherewith they that were burnt had offered; and they were made broad plates for a covering of the altar: to be a memorial unto the children of Israel, that no stranger, which is not of the seed of Aaron, come near to offer incense before the Lord; that he be not as Korah, and as his company: as the Lord said to him by the hand of Moses. (Numbers xxvi. 36—40.)

But even the terrible visitation which they had witnessed was insufficient to quell the spirit of revolt which had spread through the rebellious congregation of Israel. The evil which Korah, Dathan, and Abiram had wrought, lived after them, and brought down new punishments. It is a singular confirmation of what we have previously stated, that the offering of incense on this second occasion was invested with even greater importance than before, for it arrested the course of the terrific pestilence which God sent to punish the sins of the congregation. This fresh attestation of Aaron's priesthood, and wondrous power granted to the incense as the distinctive cognizance of his sacerdotal office, was an act of omnipotent mercy, since it ever after prevented any attempt to usurp so sacred a function.

Imagination cannot conceive a more awful scene than the one briefly and simply portrayed by the sacred historian, in Numbers xvi. 41—48. The mutinous congregation surrounding the chosen brothers, and threatening their lives;—the pause of mingled awe and terror when the cloud which announced the visible presence of Jehovah settled in its glorious radiance on the tabernacle of the congregation,—the sudden and wasting pestilence which instantly struck down fourteen thousand seven hundred of the mutineers,—the trembling haste with which Aaron took fire from the altar and laid on incense,—above all, his position when standing on the narrow line which severed the living from the dead, combine to render this one of the most fearfully impressive narratives in Scripture.

Not only was the offering of incense limited to particular persons, but the kind of incense which should be used, and the proportions of the ingredients in its composition, were distinctly specified. It should only be kindled by the sacred fire from the altar; Aaron's two sons, Nadab and Abihu, were destroyed for burning strange fires in their censers. Hence when Isaiah describes the Divine indignation against the national sins of Judah, he represents Jehovah declaring "incense is an abomination to me," for he could use no stronger expression to denote how far the transgressions of the Jews had removed them from the favour of their father and their God, than the rejection of those acts of homage to which the highest importance was given under the Mosaic dispensation.

Among the heathen nations generally, the offering of incense was not restricted to the priests, but it was always regarded as the most solemn act of homage which could be offered to a divinity. Hence in the early persecutions of the Christians, the most common trial to which the martyrs were subjected, was to require them to burn a few grains of incense on the altar of an idol; and the same test appears to have been used when the Syrian kings of the family of the Seleucidæ attempted to force idolatry on the Jews in the time of the Maccabees. But on both occasions there were multitudes found who refused to abjure their true and living faith, but sealed their testimony to the truth of that which they had believed, by their blood. Thus it may be said that there was not a single altar of antiquity on which incense was ever offered, that is not a monument illustrating the truths of the Bible, attesting the Divine origin of Christianity, and proving that it is the only religion which has decisively triumphed over death and the grave.

Let your desires and aversions to the common objects and occurrences in this life be but few and feeble. Make it your daily business to moderate your aversions and desires, and to govern them by reason. This will guard you against many a ruffle of spirit, both of anger and sorrow.—Watts.

If I were to choose the people with whom I would spend my hours of conversation, they should be certainly such as laboured no further than to make themselves readily and clearly apprehended, and would have patience and curiosity to understand me. To have good sense, and ability to express it, are the most essential and necessary qualities in companions. When thoughts rise in us fit to utter among familiar friends, there needs but very little care in clothing them.—Steele

NEW SOUTH WALES.

DISCOVERY OF AUSTRALIA FELIX, OR THE HAPPY.

MAJOR MITCHELL, the Surveyor-General of New South Wales, has recently published a highly-interesting account of discoveries made by him in the course of three journeys into the interior of that interesting country, undertaken by order of the government. The first was in 1831 and 1832, to the north-west, in search of a large river called the "Kindur," which had been described by a runaway convict, as existing in that direction, and by following which towards the S.W., the convict stated he had twice reached the sea. The information, however, turned out to be erroneous, and is supposed to have been a pure invention of the convict for his private ends. Major Mitchell penetrated to the Karaula River, (latitude about 29° S., longitude about 149° E.,) when he was obliged to return, owing to the hostility of the natives. The second expedition was undertaken in 1835, for the purpose of exploring the course of the river Darling, and was performed in a north-western and western direction, until the travellers reached the latitude of about 32½° S., and longitude 142½° E., when the molestations of the natives again made it advisable to retreat, having, however, followed the course of the river for several hundred miles, and obtained strong presumptive evidence of its junction with the Murray. The third expedition, in 1836, had for its object to trace the Darling into the Murray, and to return up the latter river, towards that part of the colony near Yass Plains. This last expedition was attended with highly-successful results; for although the natives again prevented Major Mitchell from obtaining ocular demonstration of the whole course of the Darling, its junction with the Murray was sufficiently ascertained, as well as the junction of the Lachlan with the Murrumbidjee, and that of the latter with the Murray. But this was not all. Instead of returning along the Murray, Major Mitchell took a south-eastern course to the sea, and discovered on the confines of the South Australian province, a beautiful and fertile region, which he describes in terms of enthusiastic admiration, and to which he gave the name of Australia Felix, or the Happy. Having reached the sea between Capes Northumberland and Bridgewater, he returned to the colony by a new track, parallel to the coast, and within the range of mountains called the Australian Alps.

The present limits of the New South Wales territory extend coastwise from about the 32nd to the 34th degree of south latitude, with a breadth not exceeding 200 miles. The portion within which land might be selected was fixed, in 1829, at 34,535 square miles, or about 23,000,000 of acres, of which Major Mitchell states, only 4,400,000 acres have been found worth having, whilst the owners of this appropriated land have been obliged to send their cattle beyond the limits for the sake of pasturage. The soil is good only where trap, limestone, or granite rocks occur, but unfortunately sandstone predominates so much as to cover about six-sevenths of the whole surface of the territory, and there the soil is merely a barren sand,—without turf, and the trees subject to conflagrations, which leave behind them little vegetable matter. The want of water, and of moisture, render the country unfit for agriculture, and until a well-arranged system of roads can be effected, there will be serious impediments in the way of communication between the isolated spots of a better description.

The unproductiveness, upon the whole, of the present Colony, induces Major Mitchell to recommend its extension, together with the formation of additional lines of communication. He proposes that New South Wales should thus be made to reach northward to the tropic of Capricorn, westward to the 145th degree of east longitude, the southern portion having for boundaries the Darling, the Murray, and the sea-coast. Even, however, of this extended territory, one-fourth part only is stated to be available for pasturage or cultivation,—one-third consisting of desert plains, and the remainder of rocky mountains and impassable tracts. The largest portion of good land is, it seems, to be found to the southward of the Murray, which is better supplied with water, the mountains being higher, and the rocks more varied, with a vast extent of open grassy downs. In this quarter lies the region which, says Major Mitchell, "we traversed in two directions, with heavy carts, meeting no other obstruction than the softness of the rich soil; and in returning over flowery plains and green hills, fanned by the breezes of early spring, I named it Australia Felix, the better to distinguish it from the parched deserts of the interior, where we had wandered so unprofitably, and so long."

The boundaries of our author's paradise are not very precisely laid down, but it may be stated to lie between the 36th parallel of south latitude and the sea, and between the 141st and 145th degrees of east longitude. It is, consequently, close to the South Australian Province. It comprises an elevated range of hills, (the Grampians,) the height of which, at one point, was found to reach 4500 feet, from whence many small rivers radiate; and one large river, "the Glenelg," is navigable for a considerable distance, and would be a most valuable means of communication, if the sand which unfortunately at present chokes up its mouth could be removed, so as to effect a free passage into the sea. Lofty timber, some tracts of rich black soil, and in general very fine grassy plains, are among the recommendations of this fertile country.

How far it may be expedient to enlarge the New South Wales colony, as suggested by Major Mitchell, is a question on which opinions may differ; and it may be somewhat premature to consider the best mode of governing a future settlement to the south of the Murray, whilst the eligibility of that district for colonization has only just become known in England. But little doubt can be entertained that the stream of emigration must before long flow into a country so desirable in itself as Australia Felix, and so conveniently situated for profiting by the advancing civilization and prosperity of the South Australian province. Our only immediate anxiety is, that this fair portion of Australia should be preserved from the taint of a convict population; and although Major Mitchell lays so great stress upon the advantages arising from the employment of convicts on public works, he seems, from the tenour of his evidence before the Transportation Committee, to be fully aware of those serious objections on moral grounds, which ought at least to preclude the introduction of convicts into any new settlements. If the plan of the extension of the New South Wales territory were to depend in any degree upon the planting of convicts in new districts, that of itself would be a decisive reason against such a measure.

We subjoin some interesting extracts. The author speaks at times with enthusiasm, but not so much so as to lead us to suspect exaggeration; and his narrative, written at the time, is clear and intelligible throughout. Without an ardent spirit, who could undergo the toils and privations inseparable from such an undertaking?

A GARDEN AT PARAMATTA.

My first day's journey terminated at the residence of my friend, Mr. John Macarthur, near Paramatta. I was received by that gentleman with his usual hospitality, and although not in the enjoyment of the best health, he insisted on accompanying me over his extensive and beautiful garden, where he pointed out to my attention the first olive-tree ever planted in Australia. Here I also saw the cork-tree in full luxuriance—the caper-plant growing amidst rocks—the English oak—the horse-chestnut—broom—magnificent mulberry-trees of thirty-five years' growth, umbrageous and green. Beds of roses, in great variety, were spread around, and filled the air with fragrance, while the climbing species of that beautiful flower was equally pleasing to the eye. I observed convict Greeks (pirates)—"*acti fatis*"—at work in that garden of the antipodes, training the vines to trellises made after the fashion of those in the Peloponnesus. The state of the orange-trees, flourishing in the form of cones sixteen feet high, and loaded with fruit, was very remarkable, as they had risen from the roots of former trees, which having been reduced to bare poles by a drought of three years' duration, had been cut off, and were now succeeded by these vigorous products of more genial seasons. Mr. Macarthur assured me, that by adopting this plan, many fruit-trees, after suffering from the effects of long-continued drought, might be renovated successfully. The want of moisture in the climate of Australia, may occasionally compel the gardener to resort to such extreme measures for the preservation of his trees: but the orange has hitherto yielded a very profitable and constant return to those who have attended to its cultivation in this colony. The luxuriant growth of the apple and pear in a climate so dry and warm, is a remarkable fact; and when we consider the exuberance of the vine in the few spots where it has as yet been planted, the variety of soil and aspect still unbroken in these southern regions, may well justify the expectation that many a curious or luxurious wine, still unknown, may in time be produced there.

But the garden, to him who sees a home in distant colonies, must ever be an object of peculiar interest; for there

while cultivating the fruits and flowers of his native land, the recollection of early days, and the country of his birth, are awakened by the vivid colours of the simple flower which his industry has reared, and which he knows to be a native of the soil to which he himself owes his existence.

Choice of Farms. The Wollombi.

In a climate so dry as that of Australia, the selection of farm-land depends solely on the direction of streams, for it is only in the beds of water-courses that any ponds can be found during dry seasons. The formation of reservoirs has not been yet resorted to, although the accidental largeness of ponds left in such channels has frequently determined settlers in their choice of a homestead, when by a little labour, a pond equally good might have been made in other parts, which few would select from the want of water. In the rocky gullies that I had passed in these mountains, there was, probably, no want of water, but then there was no land fit for the purposes of farming. In other situations, on the contrary, there might be found abundance of good soil considered unavailable for any purpose except grazing, only from the want of 'frontage' (as it is termed,) on a river, or chain of ponds. Selections have been frequently made of farms, which have thus excluded extensive tracts behind them from the water, and which, remaining consequently unoccupied, have continued accessible only to the sheep or cattle of the possessor of the water-frontage.

In these valleys of the Upper Wollombi we find but little breadth of alluvial soil, but the water never fails, and this has already attracted settlers to its banks—and those small farmers who live on a field or two of maize or potatoes—and who are the only beginning of an agricultural population, as yet apparent, in New South Wales—show a disposition to nestle in any available corner there. But on the lower portion of the Wollombi, where the valley widens, and water becomes less abundant, in the sandy soil, I found it impossible to locate some veterans on small farms which I had marked out for them, because it was known that in dry seasons, although each farm had frontage in the Wollombi Brook, very few ponds remained in that part of its channel.

A Sea of Mud (near the River Gwydir).

The soil, as from experience we had reason to expect, had become very soft, and the rain pouring in torrents, softened the surface more and more. The wheels, however, did go round, and the party followed me over a plain, which scarcely supported even a tuft of grass on which I could fix my eye in steering by compass through the heavy rain. At length, I distinguished through the liquid medium, half a dozen trees, towards which we toiled for several hours, and which grow, as we found when we at length got to them, beside a pond of water; the only one to be seen on these plains. There was also some grass beside the pond, and we encamped on its bank, placing the carts in a line, at right angles to the trees, thus taking possession of all the cover from an attack that could be found. We had travelled eight miles over the open plain in a straight line, and considering the state of the earth, I was surprised that the cattle made any progress through it. When the clouds drew up a little, I was not sorry to discover that the plain was clear of wood to a considerable distance on all sides, nor to recognise some of the hills overlooking our old route. According to the bearings of several of these, I found that the plundered camp was only seventeen miles distant, the ground was so soft that we could not move further with the carts, until fair weather had again rendered it passable, and under these circumstances I resolved to halt the party here, until after my intended excursion to Bombelli's Ponds.

Feb. 16.—The rain poured from a sky that might have alarmed Noah. The ground became a sea of mud; even within our tents we sank to the knees, no one could move about with shoes—the men accordingly waded about barefooted. The water in the pond was also converted into mud. Ground-crickets of an undescribed species—which perhaps may be called *Gryllotalpa Australis*—came out of the earth in great numbers.

Results of the First Expedition.

This journey of discovery proved that any large river flowing to the north-west, must be far to the northward of the latitude of 29°. All the rivers south of that parallel, and which had been described by the Barber as falling into such a river as 'the Kindur,' have been ascertained to belong wholly to the basin of the Darling.

The country we traversed was very eligible in many parts, for the formation of grazing establishments—as a proof of which it may be mentioned that flocks of sheep soon covered the plains of Mùlluba, and that country around the Barber's stockyard has, ever since the return of the expedition, been occupied by the cattle of Sir John Jamieson. At a still greater distance from the settled districts, much valuable land will be found around the base of the Nundawàr Range. The region beyond these mountains, or between them and the Gwydir, is beautiful, and in the vicinity, or within sight, of the high land, it is sufficiently well watered to become an important addition to the pastoral capabilities of New South Wales.

ON THE EARLY MODES OF MEASURING TIME.

I. Divisions of Time.

In the dawn of society, when man had not yet entered upon that career of activity which the developement of mind, the ties of social life, and the gradual growth of his wants and wishes, rendered necessary, the progress of *time* was not an occurrence of paramount importance to him. The day was quite long enough to enable him to cultivate and gather the produce of the ground, or to hunt and appropriate for purposes of food the animals around him. From these he obtained food and clothing; and thus his wants, limited in extent, were easily supplied.

But when increase of population rendered necessary the search for new regions, and when the mental tastes of men began to multiply the number and variety of their employments, it was found necessary to mark the course of time; to distinguish those periods of the year when the fruits of the soil were in a fit state for food; those periods in which the rainy season occurred; and (among those nations which were further removed from the equator) those periods when cold blighted the verdure of the trees and flowers. Thus an observance of annual seasons sprang up, long before anything was known of the astronomical causes of those seasons.

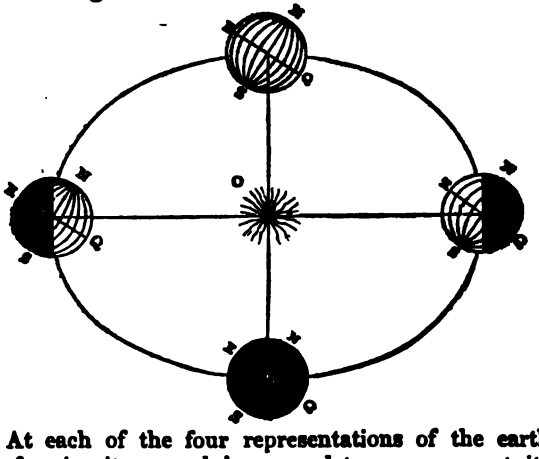
But it was moreover necessary to divide the day into smaller portions. Men perceived that night succeeded day with great regularity; and they could not have been long in observing that when the day-light was shorter in duration, the night was proportionably lengthened; and that, conversely, when in summer the day-light was prolonged, the nights were accordingly shortened—the day and night together forming a period of time (nearly) equal at every part of the year, and in every country. This statement is true with respect to the countries occupied in the early stages of society; all of which were within a few degrees of the extreme latitudes of the Mediterranean sea: but the inhabitants of those comparatively small portions of land situated at a higher latitude than 66½° experience no night at all at Midsummer, and suffer a complete deprivation of daylight at Midwinter. This becomes more marked, as we approach nearer to the poles. The sun does not shine on the north pole from the twenty-first of September to the twenty-first of March, with a small exception, (due to atmospheric refraction,) at the limits of that period; but from the twenty-first of March to the twenty-first of September the sun never sets to the north pole. Clouds and fogs may obscure his rays, but he is constantly above the horizon. It follows from this that there is but one night and one day in a whole year at the north pole, each having a duration of six months. The same conditions obtain at the south pole, excepting that the times are reversed; summer, or day, (for in this case these terms are convertible

into each other,) occurring at the south pole, when it is winter, or night, at the north. The uninterrupted depression of the sun below the horizon at Midwinter occurs in latitude 66½° for a period of only three or four days; while, as we have seen, this continued depression lasts for six months at the poles. It necessarily results that intermediate latitudes experience a Midwinter darkness, increasing in duration as we approach the pole. These nocturnal days, (if we may be allowed the term,) are, for five or six different latitudes, as follows: viz.—

In latitude	66½° North,	from Dec. 20	to Dec. 23
	70 „	Nov. 22	Jan. 20
	75 „	Nov. 3	Feb. 7
	80 „	Oct. 19	Feb. 22
	85 „	Oct. 6	Mar. 7
	90 (or at the pole)	Sep. 21	Mar. 21

We must observe, however, that at the limits of each of these periods there is a very long twilight. The sun is not above the horizon, but he is so nearly on a level with it, that for many successive hours, (and, near the pole, for many successive days,) the light yielded is equivalent to that which just precedes sunrise in our own climate.

This continued absence of the sun is wholly due to the obliquity of the equator to the ecliptic; that is, the earth's motion round her axis, is not in the same plane as her motion round the sun, but is inclined to it at an angle of 23½°, as may be observed in the annexed figure.



At each of the four representations of the earth performing its annual journey, let N S represent its axis, and E Q the equator, O being the sun. If the earth's motion round its axis be in the plane of its orbit, E Q would coincide with the orbital line, and N S would be at right angles with it. The seasons, and days and nights, would remain constant all over the world; for the sun would always shine perpendicularly to the equator. But, as it is, we observe at one time of the year the north pole wholly enlightened, and the south pole in darkness: this is our *summer*. At another time of the year, the north pole is dark, and the south pole is light: this is our *winter*. The intermediate states are *spring* and *autumn*.

Such then is the case with reference to the regions within the arctic and antarctic circles, which surround the poles, the former the northern, and the latter the southern, at a distance of 23½°. But in the times of the ancient Babylonians and Egyptians, these polar regions were unknown, and consequently there was no deviation from the rule, that the duration of an artificial day (the time that the sun is above the horizon) added to the following night, made an equal quantity at all times of the year. Subsequent observations have, however, detected a deviation, which comes properly under the subject of Equation of Time, to which we shall allude hereafter.

This period, then, the natural day, or one whole revolution of the earth with respect to the sun, the ancients wished to divide into smaller portions, to indicate the times of recurrence of similar employments or ceremonies on each successive day. The boundary of one such portion was the instant that the sun attained his greatest elevation in the heavens: that moment was exactly midway between the preceding and the following nights. The moment of greatest darkness, or when the sun has his greatest depression below the horizon, was found to be just half a natural day after his greatest height above it. Thus *midday* and *midnight* formed two convenient boundaries, by which the day could be divided into two equal parts. Those parts were each subdivided into two portions, by noticing the times when the sun rose in the morning, and set in the evening. In the latitude of Great Britain considerable difference is observed in these hours at different parts of the year; the sun rising in Midsummer before four o'clock, and in Midwinter not till after eight o'clock: the setting of the sun being in a corresponding manner variable. But in the countries which were first peopled, such as Mesopotamia, Persia, Egypt, Syria, &c., the hour of sunrise is not subject to so much variation. The length of daylight, therefore, although unequal throughout the year, is not so much so as with us. Thus arose four nearly equidistant points of division: *midnight*, *sunrise*, *midday*, and *sunset*.

These natural divisions of a day formed the groundwork of all diurnal arrangements among the early nations. The Jews reckoned their days from evening to evening; the time of sunset being considered the beginning of each day. But as sunset (as we have just observed) occurs at different times in different periods of the year, the beginning of their day necessarily varied. The time of sunset in Judæa is about five o'clock at Midwinter, and about seven o'clock at Midsummer, which makes a difference of two hours in the point from which they commenced their day.

It was not until a subsequent period that *hours* were introduced among the Jews; for it would appear from a passage in Nehemiah, chap. ix. v. 3, that the civil day was, about 450 B. C., divided into four parts. Again, David, in Psalm LV., ver. 17, speaks of evening and morning and noon, as if they were stated points of division in the day.

THE caprices of the wind are the hourly and proverbial subject of remark, and, not seldom, of thoughtless complaint. Even for these, however, there are causes, though we know them not; and in every caprice or change there is a benefit for some one. Had man possessed the power which fable has sometimes assigned him, could he have regulated them so well; capricious and causeless as they may seem? But there is a peculiarity in the distribution of these apparently capricious winds, which marks a design in the midst of all this seeming disorder. In the great Trade-wind the design is obvious: it circulates round the globe where the ocean is widest, and is thus the great aid to the chief highway for the most distant communications. It is always to be found where it is wanted; while the steadiness of its destinations from the fundamental course renders it, in those parts, not less useful. Within the range of those several winds, the navigator requires little which he cannot accomplish through their aid; while when they become evanescent, the very shores which he desires to reach or to navigate, begin to act on them and produce the variable and local winds to aid him. If this be chance or contingency, to the same causes do we owe the tides of the narrow seas.—MACCULLOCH.

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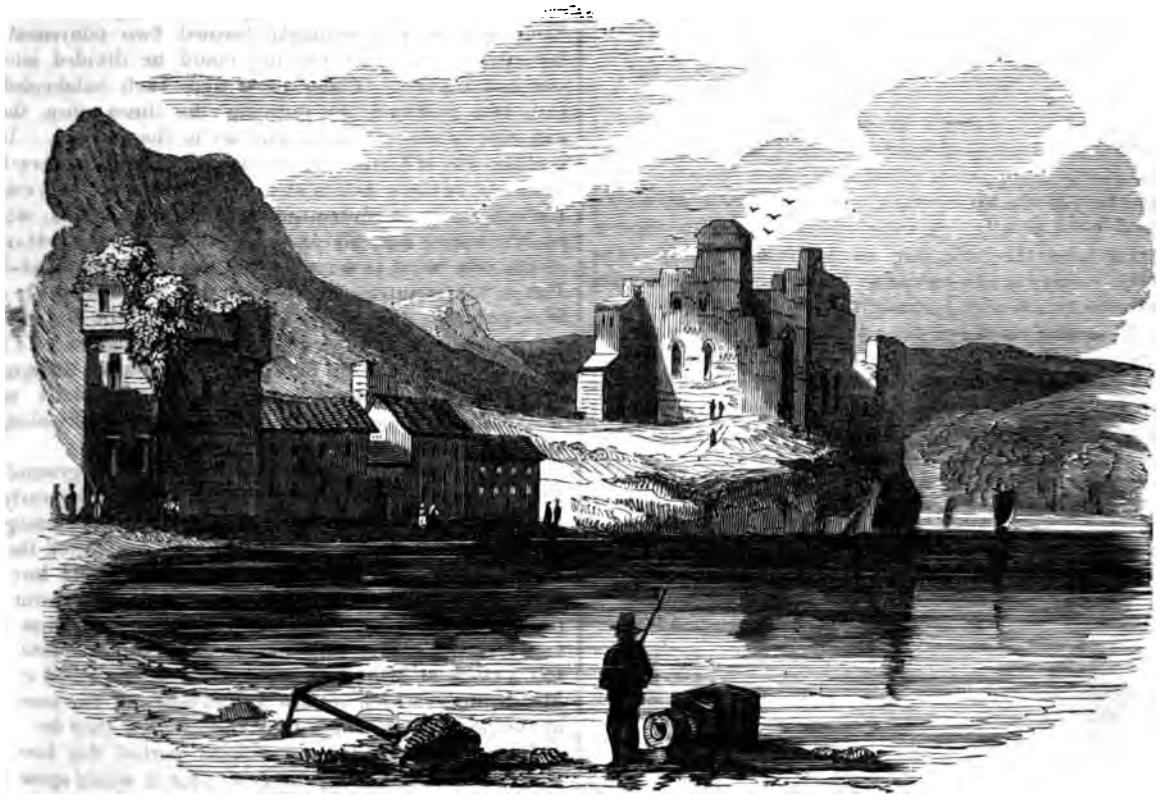
CARLINGFORD, IN THE COUNTY LOUTH, IRELAND



RUINS OF CARLINGFORD CASTLE.

CARLINGFORD is a small sea-port town, in the parish of the same name, in the barony of Lower Dundalk, in the county of Louth, and the province of Leinster. It stands at the foot of an extensive range of mountains, and on the south-eastern side of the spacious and beautiful inlet, called Carlingford Bay; it lies to the north of Dublin, at a distance of seventy-five miles. The origin of the town is commonly traced to the erection of the castle, whose ruins form so conspicuous a feature of the place at the present day; this edifice, which is called Carlingford Castle and King's Castle, is generally said to have been built by order of King John, when he was in this kingdom, about the year 1210. It was an important station during the early ages of the English dominion in Ireland; and although it was never regularly fortified, or even surrounded by a wall, it was a place of strength, from the circumstance of every house of any importance in it being a small fortress or castle, fully capable of resisting a sudden attack. Its position upon the frontiers of the English pale necessarily exposed it to frequent dangers.

The ruins of Carlingford Castle at the present day are among the finest in Ireland. Thomas Wright, in his *Louthiana*, thus describes its appearance in the latter part of the last century:—

Formerly it must have been a very fine pile of building, and seems, by its situation, designed to defend a narrow pass at the foot of the mountains, close by the sea; where but a very few men can march abreast, dangerous rocks and a deep sea being below on one side, and very high mountains on the other, the least 700 yards perpendicular. The foundation of it is a solid rock, washed by the sea, and some of the walls are eleven feet thick. On one side of it there appears to have been a platform or battery, which some time or other may have been adapted for the defence of the harbour, which is one of the finest in Ireland. The old town of Carlingford seems to have been originally all small castles, which appears to have been the common kind of habitations in this country, and the manner of building in those days; Dundalk formerly having also been full of the like sort of dwellings.

On the southern side of the town, or that opposite to the side on which the castle stands, are the ruins of a Dominican monastery, of the date, as is generally supposed, of the fourteenth century; a religious house of that order was established here by Richard de Burgh, Earl of Ulster, in the year 1305. In the thirty-fourth year of the reign of Henry the Eighth, "the prior was found seised of a church and belfry, chapter-house, dormitory, hall, kitchen, and other buildings; one acre, one park, one close, seven messuages, and a water-mill, with their appurtenances, in the vill of Carlingford, of the annual value, besides all reprises, of *4l. 6s. 8d.*"

Before the union, Carlingford returned two members to the Irish House of Commons. The population of the town is now 1300, and that of the parish

near 10,000. Upwards of 2000 hands are engaged in the fishery; the oysters taken at Carlingford are celebrated for their delicious flavour, even in the metropolis of Ireland. The water in the extensive bay is deep, but unfortunately the entrance is obstructed by hidden rocks, which render the navigation dangerous for vessels even of moderate size; the linen and butter which the town exports are thus conveyed in small craft entirely.

The scenery of the bay is, however, described as of the most enchanting description; its shores being decorated with attractive villages, numerous bathing lodges, and agreeable cottages; "behind which some mountains rise, infinitely varied through all their elevation; here waving with ornamental woods, there glowing with heath or verdure; on the one side battlemented with a gray expanse of rocks, on the other exhibiting the industrious extensions of cultivation." The mountain overhanging King John's castle is about 1850 feet in height; and it is "by reason of its position and height," to use the language of Mr. Wright, that "the inhabitants of this town, great part of the summer season, lose sight of the sun several hours before he sets in the natural horizon."

Carlingford enjoys also a celebrity arising from another source. In the early part of the last century the mountains in its neighbourhood afforded a retreat to Redmond O'Hanlon, one of the most distinguished "Rapparees" that Ireland has produced. It is, of course, not our intention to entertain our readers with a narrative of the exploits of this redoubted hero; but, as it is impossible to read the Irish history satisfactorily—(especially of that important period which immediately followed the expulsion of James the Second from England)—without knowing what the Rapparees were, we shall give a short account of them. In speaking of the Rapparees it is impossible to avoid some mention of a kindred class—called *Tories*—who make an equally important figure in an earlier page of the history of Ireland. It is scarcely necessary to inform our readers that the lawless bands whose exploits are here described, were a very different class of persons from those friends of religion and order who, in modern times, have been distinguished by the same name, and that consequently the sense in which the word Tories occurs in this portion of Irish history, is the very reverse of that which it has borne in this country for the last hundred and fifty years, as the designation of a political party.

The epithet, Tory, is supposed to have originated in the civil wars which desolated Ireland, during the reign of Elizabeth, and was applied only to the peasantry. Sir Richard Cox, in his history of Ireland, speaking of Sir Henry Sydney, the Lord Deputy, in 1575, says:—

It is observable of this great good man, that although he did most excellent service in Ireland, yet he was but ill rewarded for it in England; and therefore he was with great difficulty prevailed with to accept the government this seventh and last time; for (as he expressed himself in his letter) he cursed, hated, and detested Ireland above all other countries; not that he had any dislike of the country, but that it was most difficult to do any service there, where a man must struggle with famine and fastnesses, inaccessible bogs, and light-footed Tories; and yet when these and all other difficulties were surmounted, no service in the world was less reputed, valued, or requited than that.

Among the measures which Sir Henry Sydney took, was the following, as related by Cox:—

And the better to discover vagabonds and Tories, every gentleman was commanded to give in a list of his dependants, and to answer for them; and proclamation was made, that every idler, that was not named in one of those lists, should be punished as a felon and a vagabond, to which the Irish lords and gentlemen gave their consents with seeming joy; and every one of them gave in pledges of his loyalty to the Lord Deputy.

Tories, robbers, and rapparees were often joined together in Irish acts of Parliament. Malme says that the term is derived from an Irish word *toree*—"give me [your money]." The character of the Tories is thus noticed by Glanville, in one of his sermons, long before the political distinction existed, "Let such men quit all pretences to civility and breeding; they are ruder than Toryes and wild Americans."

During the Irish rebellion of 1641, this name was bestowed on such individuals as at first professed to remain neutral in the contest, but who, ultimately, perhaps urged by the loss of their property and their consequent distress, took up arms with a view of reprisal or revenge on those by whom they had been reduced to absolute ruin. English and Irish, Protestant and Catholic, Republican and Loyalist, were alike their common enemies; and Tories, being joined by men of desperate fortunes, united themselves into bodies; and, in fact, became formidable gangs of freebooters, who harassed the regular troops of all parties without distinction. The name, therefore, was one of reproach, and "Tory-hunting" was almost viewed in the light of a pastime. An old rhyme, in allusion to this sport, is still orally current in the south of Ireland, and a decided favourite in the nursery collection.

Ho! Master Teague—what is your story?
I went to the wood and I killed a Tory.
I went to the wood and I killed another.
Was it the same, or was it his brother?

I hunted him in and I hunted him out,
Three times through the bog, about and about;
When out of a bush I saw his head,
So I fired my gun and I shot him dead.

The Rapparees are posterior, in the order of time, to the Tories. Todd, in his edition of Johnson's Dictionary, thus explains the meaning of the word Rapparee:—

A wild Irish plunderer, so called, Mr. Malme says, from his being armed with a half-pike, termed by the Irish a *rapery*. In an account of General Blakeney, which I have read, I find, however, that 'from a weapon, shaped like a rake, called a *rapp*, which [such persons] carried instead of a spear, they were called *rapparees*.'

Cox, in "an Explanatory Index of some Quotations and Terms," attached to his Hibernia Anglicana, which was published in 1692, has the following definition:—

Raporees, the rabble of the Irish, who are armed with a half-pike, which they call a rapery, and have plundered the English in all parts of the kingdom.

The name seems to have been first used in the war which followed the Revolution of 1688, when James the Second, after his flight from England, attempted to make a stand in Ireland.

Bishop Burnet, relating the events of 1690, in his *History of his own Times*, says, after describing the raising of the siege of Limerick by the forces of King William, and the departure of the French allies of James from Ireland,

In the meanwhile the Irish formed themselves into many bodies, which, by a new name, were called Rapparees: these knowing all ways, and the bogs and other places of retreat in Ireland, and being favoured by the Irish that had submitted to the king, robbed and burnt houses in many places of the country; while the king's army studied their own ease in their quarters, more than the protection of the inhabitants: many of them were suspected of robbing in their turn, though the Rapparees carried the blame of all between them the poor inhabitants had a sad time, and their stock of cattle and corn was almost quite destroyed in many places.

On another occasion, in the same year, he says:—

Great complaints were brought over from Ireland, where the king's army was almost as heavy as the Rapparees were.

Mr. Crofton Croker says, that Rapparee has much the same meaning as Tory, and that it is derived from an Irish word signifying a half-stick or broken beam, resembling a half-pike, from whence the name was given to such as carried this weapon, and did not belong to the regular troops of either army, but provided themselves, in the best way they could, with pikes, daggers, or skeins, and such instruments of offence as could be readily manufactured. It seems, however, that the Tories, in the reign of Charles the First, received originally some provocation, and that their conduct can be better vindicated than that of the Rapparees of William's days. It is asserted, and with strong claims to belief, that the Irish commanders of the army which supported the cause of James the Second, after his expulsion from England, encouraged, by written protections, the Rapparees to surprise and plunder the straggling and detached parties of William's forces; particularly during the winter, when general hostilities were suspended; by which means they not only harassed them extremely, but accumulated a supply of horses and muskets, that enabled the Irish to bring an additional number of men into the field the ensuing season.

The author of a work intitled *The State of the Protestants of Ireland, under the late King James's government, &c.*, published in 1691, and generally attributed to Dr. William King, Bishop of Derry, and afterwards Archbishop of Dublin, gives the name of Rapparees to the levies made by James the Second, in Ireland, upon his expulsion from England. After expatiating upon James's design, to destroy the Protestant religion, he proceeds to show "King James's actual progress in our destruction;" and among other measures of James, refers to his disbanding of the old army, which he found at his accession, and collecting a new one. He narrates its effects in Ireland while James remained on the throne, and before the arrival of William and his Dutch army:

But when (he adds) the descent was made by his present majesty into England, things grew yet more troublesome. The Protestants were every where robbed and plundered. The new commissioned officers and their soldiers, under the new name of Rapperies, committed many outrages and devastations on their Protestant neighbours; insomuch that they could not be safe in their houses. If any endeavoured to keep their houses, though merely to secure themselves from the robbers and Tories, immediately they were besieged; and though they surrendered themselves as soon as summoned, having no design to resist authority, and put themselves into the hands of King James's officers, upon promise of freedom, nay, or articles, yet afterward they were imprisoned and prosecuted, as Mr. Price, of Wicklow. Some of them condemned and executed.

The same writer makes it a principal ground of complaint against King James, that the new levies which he raised in Ireland, when the Prince of Orange landed in England, were principally old rebels, Tories, and robbers:

All the scum and rascality of the kingdom were made officers; every where the Papists armed and enlisted themselves, and the priests suffered no man to come to mass that did not arm himself with, at least, a skean and a half-pike, [the Rapparees' weapon]. . . . . Most of them were the sons or descendants of rebels, in 1641, who had murdered so many Protestants. Many were outlawed and condemned persons, that had lived by torying and robbing. No less than fourteen notorious Tories were officers in Cormuck ô Neal's regiment; and when forty or fifty thousand such were put into arms, without any money to pay them, we must leave the world to judge what apprehensions this must breed in Protestants, and whether they had not reason to fear the destruction that immediately fell on them. They saw their enemies in arms, and their own lives in their power. They saw their goods at the mercy of those thieves, and robbers, and Tories, now armed and authorized, from whom they could scarce keep them, when it was in their power to pursue and hang them.

These last lines contain an evident allusion to the sport of "Tory-hunting."

When a Rapparee became a prisoner he had no hope of mercy; the gallows or a bullet instantly terminated his existence. The necessity, however, as Mr. Crofton Croker observes, is obvious, that no quarter should be given to men who lurked in ambush, ready to spring on their prey at every favourable opportunity, and whose acquaintance with the country enabled them to lie concealed in the most artful and treacherous manner. But to this unfortunate necessity it is to be feared that many innocent persons fell victims; for in those indiscriminating times, very little trouble was taken by either party to ascertain the guilt of an individual, so long as he was obnoxious; and in all probability many of the simple peasantry were punished, as being Rapparees, when they had no title whatever to that distinction. Indeed this is plainly stated to be the case by a contemporary writer, in *An Answer* to Dr. King's work, already quoted, which is generally attributed to Mr. Charles Leslie, who had rendered himself conspicuous as a staunch supporter of the Protestant interest in Ireland; although, on the accession of William and Mary, he refused to acknowledge their supremacy, and became one of the heads of the non-juring interest. After citing some instances of what he styles the breach of the Articles of Cork and Limerick, he adds:—

But the vast number of poor harmless natives who were daily killed up and down the fields, as they were following their labour, or taken out of their beds and hanged, or shot immediately for Rapparees, is a most terrible scandal to the government, which the Protestants themselves do loudly attest; and many of the country gentlemen, as likewise several officers, even of King William's army, who had more bowels or justice than the rest, did abhor to see what small evidence, or even presumption, was thought sufficient to condemn men for Rapparees, and what sport they made to hang up poor Irish people by dozens, almost without pains to examine them; they hardly thought them *humane kind!*

The tactics of the Rapparees, if we may use the expression, are exposed in the following passage, from an old writer; it will be seen at once that they had no title whatever to the name and privileges of a fair and open enemy:

When the Rapparees have no mind to show themselves upon the bogs, they commonly sink down between two or three little hills, grown over with long grass; so that you may as soon find a hare as one of them. They conceal their arms thus:—they take off the lock and put it in their pocket, or hide it in some dry place; they stop the mussle close with a cork, and the touch-hole with a small quill, and then throw the piece itself into a running water or pond; you may see an hundred of them without arms, who look like the poorest humblest slaves in the world, and you may search till you are weary before you find one gun; and yet, when they have a mind to do mischief, they can all be ready on an hour's warning, for every one knows where to go and fetch his own arms, though you do not.

This acccount has been ridiculed by some writers, but Mr. Crofton Croker sees no reason to question its accuracy, "as during the years 1793 and 1794, the disaffected in the north of Ireland concealed both themselves and their arms, from the soldiery sent to disperse their meetings, in a similar manner."

In the *Military Articles* which were agreed upon between the commanders of the English and Irish armies, immediately after the treaty of Limerick, in 1691, it was stipulated on behalf of the "Rapparees or Volunteers," (for it seems that they preferred calling themselves by the latter name,) in the same manner as on behalf of the regular Irish troops, that such as were willing to leave the kingdom of Ireland should have free liberty to embark, and go to any country beyond the seas, England and Scotland excepted.

While the Irish army were embarking, the Lords Justices issued a proclamation, offering pardon to those Rapparees who should come in within a given time, deliver up their arms, take the oath of allegiance, and return quietly to their homes. Those who neglected to do so, might be killed by any one who thought proper: and any person who had an arm strong enough to engage in so profitable a trade was to receive the sum of 40*s.* for every Rapparee's head that he could produce.

The Rapparees, however, (says Mr. O'Driscol,) submitted every where, and without hesitation. They had no idea of continuing the war on their own account, and were now to be seen in great multitudes, traversing the country, and driving their flocks and herds before them, as each party returned to their own homes. They appeared well fed and clothed, and possessed abundance of cattle.

But though as a body they submitted, and their large bands were dispersed, their habits of robbery and plunder were not destroyed, and they continued for some time to violate the laws, by murders and depredations of all kinds. The White Serjeant, Galloping Hogan, Redmond O'Hanlon, Ned of the Hills, and Iron Mac Kabe, are the names and titles by which some of the most noted Rapparee leaders were distinguished. "A History of the Irish Rogues and Rapparees," has long been one of the most popular books among the peasantry of Ireland, and has circulated to an extent that seems almost incredible; we are told, too, that it is not unusual to hear the adventures and escapes of highwaymen and outlaws recited by the lower orders with the greatest minuteness, and dwelt on with a surprising fondness. Redmond O'Hanlon, the Carlingford hero, is often spoken of as the Irish "Rob Roy," and is said to have levied his black mail with as much strictness and precision as his Scottish rival.

RECREATIONS IN NATURAL PHILOSOPHY.

No. X.

CENTRE OF GRAVITY.

IN the last article we stated* that animals are in the constant habit of so adjusting their centre of gravity, that the line of direction shall fall within the supporting base. But the young philosopher may ask, what becomes of the centre of gravity, and the point of support in a flying bird? To answer this question we must inquire what is meant by flying.

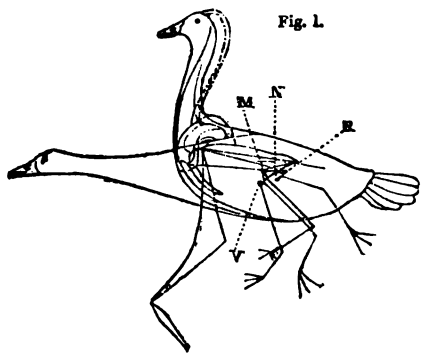
A bird flying in air is similar to a fish swimming in water: the bodies of these animals are well adapted to their respective elements: they are wedge-shaped, and hence encounter less resistance to their motions: the fish is buoyed up in water by a bladder containing a peculiar kind of air; and this bladder can, in general, be inflated or exhausted at the will of the animal; it is a cruel experiment to puncture the air-bladder with a pin; the air escapes, and the fish, when thrown into water, sinks without the power to rise. The fins of a fish act as oars, and its tail as a rudder. In like manner the bird is furnished with air-cells largely distributed through its body: its bones are without marrow, in order that they may be filled with air in the act of flying. Previous to flight the bird inflates its cells by one or two deep inspirations, spreads out its wings and the feathers of its tail, and springs into the air, which it strikes with all its force with its wings, and is thus impelled forwards or upwards in an oblique direction. Thus the bird continues alternately closing and extending its wings: elevating them when closed, then opening them and bringing them down forcibly against the air, when they are again closed, and so on: thus the wings act as oars, and the legs or the tail as the rudder. Hence it will be seen that the bird is supported in air by the air itself, in consequence of certain mechanical actions on the part of the animal, its general lightness and buoyancy, and the resistance of the air to the strokes of the bird's wings. When a bird hovers in the air its wings are widely extended, so that large concave surfaces are presented to the air, whose resistance opposes the fall of the animal.

During the flight of a bird, its head, neck, and legs, come into action, either to preserve, or to shift the position of the centre of gravity; and the facility with which they do this may often be amusingly observed. Thus, the Rev. Gilbert White, in one of his charming Selborne letters, says:—

Owls move in a buoyant manner, as if lighter than the air; they seem to want ballast. There is a peculiarity belonging to ravens that must draw the attention even of the most incurious—they spend all their leisure time in striking and cuffing each other on the wing, in a kind of playful skirmish; and when they move from one place to another, frequently turn on their backs with a loud croak, and seem to be falling to the ground. When this odd gesture betides them, they are scratching themselves with one foot, and thus lose the centre of gravity.

The following figure will show the position of the centre of gravity in a bird, in four of its positions; V when it is flying, M when walking, N when swimming, and R when asleep with its head under its wing, and supported on one leg.

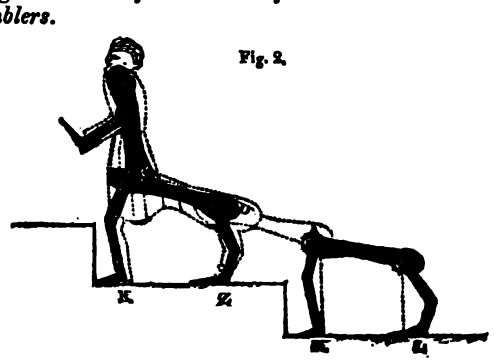
Fig. 1.



We have already stated that a number of ingenious toys are constructed with especial reference to their centre of gravity. When this is below the point of support, in a figure, it becomes difficult to upset it, and a variety of motions can be imparted to it which appear strange and unnatural. So also by so arranging the internal mechanism of the figure, that the centre of gravity may be constantly shifting within certain limits, a progressive motion may be communicated, as in the following illustration of a toy which tumbles down stairs backwards.

This toy is an Indian invention. It is called by the French a *Sautriant*, from the French verb *sauter*, to jump. They also call their tumblers and those men who throw back summersets, *Sauteurs*. In England this toy is known by the name of the *Chinese tumblers*.

Fig. 2.



* See *Saturday Magazine*, Vol. XIII., p. 220.

In fig. 2 we have a representation of the internal mechanism of the figure; but we will first refer to fig. 3, in which the secret of the movements consists. A B is a thin piece of wood, in which, in the direction of its thickness, two oblique canals, G C, D F, are channelled. At each end is a receptacle *f y*, so formed that if the spot C be an axis, and the receptacle *y* be filled with mercury, the part to the left of C would be heavier than all the wood-work on the right of C, in consequence of which the wood would tip over round the axis passing through C. The sides of the receptacles and the canals are closed in with card.

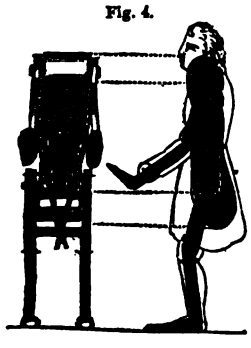
Fig. 3.

Pieces of wood representing arms are attached to the axis D, and other pieces for legs to the axis C. A head, a jacket, and trousers, are then added, and we get the figure as shown in figs. 2 and 4.

Let us suppose the figure (2) to be on its feet, and mercury in the lower receptacle. The top overbalances backwards; the arms swing back, and the palms come to rest upon the stair, so that the head is lower than the body, but the feet and hands are on the same stair. The mercury in C then flows down to D, which again throws the centre of gravity below the lower axis, and the figure makes another summerset, alighting on its feet at K on the next lower stair.

The different parts of the figure are kept together by means of silken strings shown in fig. 4: these strings also serve, by their tension, the additional purpose of helping to overturn the figure in its descent from one stair to another, and to produce a momentum which carries the centre of gravity of the figure beyond the line of direction, so that when the mercury, by flowing to the lower channel, places the figure one step lower, its various parts are held together by the silken threads in the same position as it was on the previous step: and thus by repetitions of these processes, the figure must continue to descend as many steps as are provided for its exhibition.

Fig. 4.



Some skill is required in constructing this toy, and many niceties of adjustment are necessary: the quantity of mercury must bear a definite relation to the weight and dimensions of the figure. In order to prevent the too rapid descent of the mercury, and consequently of the figure, strings are stretched across the channels to retard the flow. The proper degree of tension of the silken cords is important and requires much attention. Indeed, in this, as in other similar examples, many an anxious hour, and, for aught we know, many an aching head, have contributed to the invention or fabrication of a toy whose only object is juvenile amusement, which being gratified, the toy is broken or thrown aside as worthless, without exciting a single inquiry into the amount of curious skill, ingenuity, and often, no mean powers of invention, which have contributed to its production.

HAPPINESS consists in the multiplicity of agreeable consciousness. A peasant has not a capacity for having *equal* happiness with a philosopher: they may be equally *satisfied*, but not equally *happy*. A small drinking glass and a large one may be equally full, but the larger one holds more than the smaller.—JOHNSON.

MATERIALS FOR THE TOILETTE.

ONE of the chief objects of reading is to inform the mind of pleasing and useful facts; to supply it with such a share of wholesome food, necessary to it, as another kind of food is to the tenement of the mind; that both may grow up together in strength and vigour, and fulfil one of the objects for which we were created.

Knowledge bears with it a train of pleasant associations, wherever and however its possessor may be engaged; and if there is one kind of knowledge more useful than another, it is that *practical* kind of knowledge which applies to common things: so that, in the act of using them, we may be, in imagination, transported to other lands; to the arts of life, which remind us of our national industry and sources of wealth; and of all the means for enjoyment, which cheer and benefit the innumerable inhabitants of the globe. By thus dwelling upon the origin and service of common things, which we constantly use, we may convert many an *idle* hour into one of *useful* recreation. To do which, it is not necessary for us to think of rare and costly productions. Our object in this series of papers is to show that the toilette can supply us with many valuable facts, with some science, and with general pleasure. Nor let it be apprehended that the attention necessary to be given by the reader to our account of the "Materials for the Toilette," will draw so largely upon his *mind*, as to interfere with the attention necessary to the adornment of his *person*. We see no reason why useful and pleasant thoughts should not accompany the cares of the toilette: we may say that the mind may be reflected from the mirror, as well as the outward features; and we feel assured, that the reader will not the less admire the reflection, if it should beam upon him or her with the bright smile of intelligence.

We are about to begin this series of Papers with what may appear to be a very homely article, viz., *Soap:* but we may remark that, however homely it may be, it is not necessarily vulgar; he may choose what variety of the article his taste dictates. So with mental pursuits: there is much of what is called polite and refined, which is essentially vulgar and worthless; and there are many things which the over-refined mind would stigmatize as vulgar, which in fact are excellent and useful. But we are quite sure that our readers do not require this hint to walk in the way towards truth.

ON SOAP.

There is a homely, but forcible, expression, (and indeed most homely expressions are forcible,) that "Cleanliness is next to godliness;" meaning thereby that habits of cleanliness, whether in person or domestic arrangements, tend not only to health of body, but to that state of moral feeling, which becomes man as the chief creature of the Almighty. One of the first acts of mental degradation is neglect of the person:—filth and rags are always associated with misery, and often with vice and crime; and this remark applies to nations as well as to individuals; for we find that the nations lowest in the scale of civilization, are those which are deprived of political freedom, of domestic comfort, and of mental culture. A man, even though the most valuable portion of his time be devoted to hard labour, if supplied through such labour with the means of procuring domestic comforts, (provided he have not lost his self-respect by vicious habits,) is necessarily an elevated being. Labour does not degrade him; but, on the contrary, renders him respected and respectable; it makes him valuable to his country and to himself. We seldom see such a man dirty, or his family in rags: he has

that within him, which produces the exalted feeling that he is a free man, possessing and enjoying the rights and dignity of freedom.

In the business of paper-making*, the due supply of rags is ensured by importing them from various parts of the Continent; and among the many varieties of rags so imported, their condition affords pretty clear indications of the state of comfort and cleanliness in particular districts and countries. The linen rags of England are generally very clean; and require little washing, and no bleaching, before they are ground into pulp. The Sicilian rags, on the contrary, are, originally, so dirty, that they are washed in lime before they are fit for the foreign market. Now we have only to compare the moral and political state of the people of Sicily with that of our own country, to be assured of the fact, that, although cleanliness be not classed among the virtues, yet it is at least their handmaid.

We now proceed to notice the manufacture and properties of that very important element in the acquisition of cleanliness;—viz., Soap.

The reader of course knows that, if oil be agitated with water, and then set aside for a short time, the mixture will separate into two distinct strata—the oil being uppermost; and that the one will not combine with the other. But if the oil and water be agitated with a little caustic alkali, such as soda or pearl-ash, (the latter is an impure potash,) the oil and water will not separate:—a compound is formed, which we call Soap.

Soap is a compound, in definite proportions, of certain principles in oils, fats, or resins, united with an alkaline base. When such base is potash or soda, the soap is soluble in water, and is useful as a detergent in washing clothes. Before entering upon the details of soap-making, we will give a short account of the substances, which enter into its composition.

The oils have been divided into two great classes, the *fixed* and *volatile*. The former are so called because the temperature at which they boil is generally very high, about 600° Fahrenheit; while the latter evaporate at the ordinary temperature of the atmosphere, or by heat: in which cases they are converted into vapour without change or decomposition. But the fixed oils cannot be brought to the boiling point, or distilled, without being decomposed, and undergoing very complicated changes.

Oils are also divided into *animal* and *vegetable*, according as their sources belong to either kingdom. The general properties of all the fixed oils are pretty much the same; so that in describing one class the same characters may be referred to all the rest. These properties have been thus arranged: 1st, the *Drying* oils, which, by exposure to the air, or by subjection to a certain process, dry into a hard resinous substance; such as linseed, walnut, hemp, castor-oils, &c. 2nd. The *Greasy* oils. 3rd. *Concrete* oils, or vegetable butters, such as cocoa-nut and palm oils, bees' wax, &c. For the process of making soap and for illumination, animal oils are preferred in this country, as being less costly than the vegetable, which with some exceptions are imported from abroad.

The vegetable fixed oils are obtained chiefly by pressure from certain seeds; such as the almond, the olive, linseed, rape, and many others. Such oils are said to be *expressed*, because they are obtained by *pressing out*, and are all lighter than water; whereas some of the essential oils, which are obtained by distillation, and partake of the nature of essences, are heavier than water. The fixed oils are viscid, and almost without taste; their colour is generally yellow, which can be removed by filtering them through animal charcoal, or even by exposure to the light; in which latter case the colour is often restored when the oil has been again long in the dark. They congeal at a temperature higher than is required to freeze water; but a few, such as linseed oil, remain liquid at very low temperatures. A few also, such as cocoa-nut and palm oil, are solid at ordinary temperatures; and hence are called *vegetable butters*.

If oil be congealed by cold, and then pressed between blotting paper, a dry concrete frothy matter is obtained, called *stearine* (from a Greek word, signifying *tallow*); the fluid matter which is separated does not congeal except at a much lower temperature, such as 20°; this fluid is called *elain*†, (from the Greek for *oil*). It is this substance which gives fluidity to all oils. The relative proportions of these substances differ in different oils. Cocoa-nut and palm oils are advantageously decomposed for the manufacture of soap and candles, and for supplying fuel to lamps. The stearine supplies the former, and the elaine the latter. Elaine does not thicken or become rancid on exposure to the air; and hence it is well adapted for lubricating the wheels of watches and other delicate machinery; whereas the oils themselves, when exposed to the air, thicken and become rancid, from the production of an acid. A few, such as linseed, nut, poppy, and hempseed oils, become covered with a pellicle, which, being removed and spread upon a surface, hardens into a resinous substance. Such are called *drying* oils; and their drying quality is much improved by boiling them with a small portion of *litharge* (Protoxide of Lead). Drying oils mixed with lamp-black, constitute *Printers' ink*.

Another remarkable property of some of the oils is, that when exposed to the atmosphere, they absorb large quantities of oxygen gas (one of the constituent parts of the atmosphere). Saussure exposed nut oil to oxygen gas; and in ten days it had absorbed sixty times its own bulk, and in three months 145 times its bulk of the gas; the absorption being most rapid in warm weather. In some cases, especially where drying oils are employed, oxygen is absorbed so rapidly, and so much heat is generated during the absorption, that combustible materials, such as lamp-black, hemp, cotton, &c., may be ignited thereby. Substances of this kind, moistened with linseed oil, have been known to take fire within twenty-four hours; and this has often been the cause of extensive fires in warehouses and cotton manufactories, where the machinery is oiled by means of hemp or cotton-wool steeped in oil. These substances, having probably been thrown aside among combustible materials, have been kindled during the night; and hence the origin of many disastrous conflagrations.

All the oils contain much hydrogen; hence they are all *inflammable*; when subjected to a high degree of heat they are decomposed, and new substances are formed. The mineral acids also exert a powerful action on the fixed oils: sulphuric acid blackens them by separating a portion of their carbon; nitric acid renders them thick and white, and when the nitric acid is concentrated, the action is sometimes accompanied with flame.

We have said that soda is the alkali preferred in this country for soap-making. The reason is that, when potash is employed, the soap always remains soft, on account of the great attraction of that alkali for moisture. Soda, on the contrary, has a greater attraction for the carbonic acid of the atmosphere than for its moisture; hence pure caustic soda by exposure to the air becomes converted into carbonate

* See *Saturday Magazine*, Vol. XIII., p. 117.

† Sometimes called *Olein*, from the Latin word for *oil*.

of soda. This, with fatty matters, forms a firm and solid soap. We therefore proceed to give a short account of the latter alkali.

Soda is a compound of a metallic substance called *sodium* and *oxygen*. Soda, in union with carbonic acid gas, called carbonate of soda, is obtained by burning various kinds of sea-vegetables, in which it exists in an impure state. The ashes being washed in water, and this solution evaporated, soda is obtained. There are two kinds of impure soda in commerce, called Barilla and Kelp. Barilla is the ash of the Salsola-soda, which is largely cultivated on the Mediterranean coast of Spain. Kelp is the ashes of sea-weeds, which are obtained upon many of the rocky coasts of Britain. About twenty-four tons of sea-weed produce one of kelp. The rough alkali is found mixed with chlorides of potassium and sodium, and with earthy impurities, from which it may, to a certain extent, be separated by solution in a small quantity of water, and by evaporation at a low heat; skimming off the crystals of chloride of sodium (common salt, of which soda is the basis) as they appear on the surface.

The following short extract from Macculloch's "Western Isles" will be found interesting:—

If this manufacture were once ill understood and worse managed, it seems now to have attained all the perfection of which it is susceptible. June, July, August, and part of September in each year, form the period of this harvest. The drift-weed, thrown on shore by storms, is sometimes used; but if much injured it is rejected, as in this state it is found to yield little soda. This kind consists chiefly of tangles, as they are here called, or Fucus Saccharinus and Digitatus, which at all times contain less soda than the harder species, and are also much better adapted for manure. The latter consists chiefly of four, the Serratus, Digitatus, Nodosus, and Vesiculosus; and these are cut at low water from the rocks on which they grow. As the value of a kelp estate depends on the magnitude of the crop, it is therefore regulated by three circumstances, viz., the linear extent of the shore, the breadth of the interval between high and low water marks (consisting of the length of the ebb, the fall of the tide, and the flatness of the beach), and the tranquillity of the water, or its shelter from the surge; to which may be added the nature of the rocks, as some kinds are found to favour the growth of the plants more than others. It has been attempted to increase the extent of this submarine soil, by rolling stones into the water; but I believe the success has never repaid the expense. On some estates this harvest is reaped every second year, on others every third; nor does it seem to be agreed, what are the comparative advantages of either practice.

The weeds being cut by the sickle at low water, are brought on shore by a very simple and ingenious process. A rope of heath or birch is laid beyond them, and the ends being carried up beyond the high water-mark, the whole floats as the tide rises, and thus, by shortening the rope, is compelled to settle above the wash of the sea, whence it is conveyed to the dry land on horseback. The more quickly it is dried, the better is the produce; and when dry it is burned in coffers, generally constructed with stone, sometimes merely excavated in the earth. In Orkney the latter are preferred. It has been attempted, idly enough, to introduce kilns; a refinement of which the advantages bear no proportion to the expense; as in the old mode the kelp forms its own fuel. As twenty-four tons of weed, on a medium, are required to form a ton of kelp, it is easy to conceive the labour employed for this quantity, in the several processes of cutting, landing, carrying, drying, stacking and burning.

Since Mr. Macculloch wrote, a change has resulted from the diminution of the duties on barilla and salt, by which a better alkali can be produced at a lower price than can be obtained from kelp.

Carbonate of soda has been of late years obtained in immense quantities from common salt. This latter is a compound of chlorine and sodium. Sulphuric acid is added, which unites with the sodium and expels the chlorine. The sulphate of soda is, in its turn, decomposed by being roasted with saw-dust or coal-dust, whereby it is converted into sulphuret of sodium. Sometimes lime is employed to get the sulphuric acid from the sodium; since that acid unites more readily with lime than with soda. But by roasting the sulphuret, the sulphur is dissipated, and the sodium is converted into carbonate of soda, —the carbonic acid being derived from the atmosphere. The carbonate is now dissolved in water and crystallized in iron coolers.

Carbonate of soda is soluble in water. When heated, it melts into a transparent liquid more easily than carbonate of Potash, and on this account it is preferred in the manufacture of glass.

Such, then, being the nature of the ingredients which enter into the composition of soap, we will proceed, in the next article, to show how they are combined in the manufacture of that substance.

A FAREWELL TO THE VANITIES OF THE WORLD.

Farewell ye gilded follies, pleasing troubles;
Farewell ye honoured rags, ye glorious bubbles;
Fame's but a hollow echo, gold pure clay,
Honour the darling but of one short day;
Beauty, the eye's idol, but a damasked skin;
State but a golden prison to live in,
And torture free-born minds; embroidered trains
Merely but pageants for proud swelling veins;
And blood allied to greatness, is alone
Inherited, nor purchased, nor our own,
Fame, honour, beauty, state, train, blood and birth,
Are but the fading blossoms of the earth.

I would be great, but that the sun doth still
Level his rays against the rising hill:
I would be high, but see the proudest oak
Most subject to the rending thunder-stroke:
I would be rich, but see men too unkind,
Dig in the bowels of the richest mine:
I would be wise, but that I often see
The fox suspected, whilst the ass goes free:
I would be fair, but see the fair and proud,
Like the bright sun, oft setting in a cloud:
I would be poor, but know the humble grass
Still trampled on by each unworthy ass:
Rich, hated: wise, suspected: scorned if poor:
Great, feared: fair, tempted: high, still envied more:
I have wished all; but now I wish for neither;
Great, high, rich, wise nor fair; poor I'll be rather.

Would the world now adopt me for her heir;
Would Beauty's Queen entitle me "The Fair;"
Fame speak me Fortune's minion; could I vie
Angels with India; with a speaking eye
Command bare heads, bowed knees, strike justice dumb,
As well as blind and lame, or give a tongue
To stones by epitaphs, be called great Master
In the loose rhimes of every poetaster;
Could I be more than any man that lives,
Great, fair, rich, wise, all in superlatives:
Yet I more freely would these gifts resign,
Than ever fortune would have made them mine,
And hold one minute of this holy leisure
Beyond the riches of this empty pleasure.

Welcome pure thoughts! welcome ye silent groves!
These guests, these courts, my soul most dearly loves:
Now the winged people of the sky shall sing
My cheerful anthems to the gladsome spring:
A prayer-book now shall be my looking glass,
In which I will adore sweet virtue's face.
Here dwell no hateful looks, no palace-cares,
No broken vows dwell here, nor pale-faced fears;
Then here I'll sit, and sigh my hot love's folly,
And learn to affect an holy melancholy;
And if Contentment be a stranger then,
I'll ne'er look for it, but in Heaven again.

SIR HENRY WOTTON. 1568—1639.

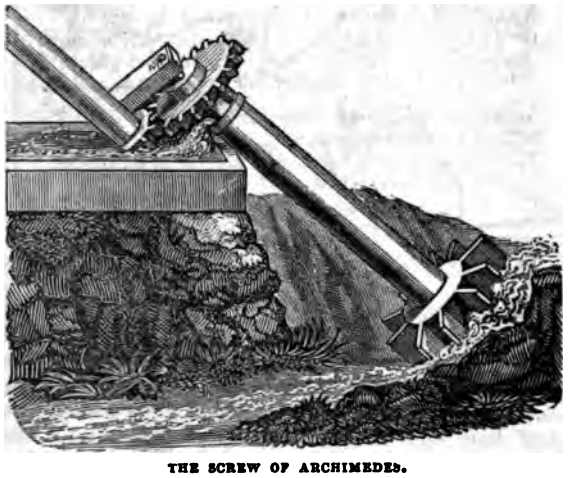
A MAN should never be ashamed to own he has been in the wrong, which is but saying in other words, that he is wiser to-day than he was yesterday.—POPE

MACHINES FOR RAISING WATER.

THE machines by which water is raised from a lower to a higher level are exceedingly numerous, and the invention of those which are most simple in their construction may be referred to the earliest ages. Among the paintings of the ancient Egyptians are found representations of a contrivance for that purpose; a simple lever with a bucket attached*, is a copy of one of these paintings: it will be seen that it exactly resembles a contrivance of the same kind much in use in England and other countries, in rural districts, where it is desirable to avoid the expense of more perfect machines. To this invention would succeed the roller and rope, as in our common draw-well The idea of a chain of buckets would soon suggest itself, and we find machines in which this combination of vessels is employed, in frequent use among many of the eastern nations; in Egypt, particularly, scarcely any other means are employed.

The Egyptian machines consist of a number of jars attached to an endless rope, which passes round a large wheel or *drum*; the jars are filled as they pass through the water, and carried up one side of the wheel; as soon as each jar reaches the top, it empties its contents into a wooden channel, which carries the water to a cistern placed to receive it: the machine is worked by a cog-wheel driven by cows or asses. The Chinese chain-pump is another example of this arrangement of buckets, for the purpose of raising water. In this country, when chain-pumps are worked, the power employed is generally water.

A very singular machine is sometimes used, called the *hair-rope machine*, and the water is raised by means of a horse-hair rope, or a bundle of ropes which pass over a drum moving with great velocity; the rope, in passing through the water below, becomes saturated with the liquid, and carries the greater portion of it to the summit of the wheel, where it is discharged into a proper receptacle, the rapidity of its motion preventing any great loss.



THE SCREW OF ARCHIMEDES.

The screw of Archimedes is another contrivance for the same purpose. It consists of a spiral tube turned by hand or otherwise; its lower mouth, at every revolution, scoops up a quantity of water, which each succeeding revolution assists in carrying upwards, until it is discharged by the opening at the other extremity of the spiral. This machine is not calculated to raise water to any great height, and it is rather cumbersome in proportion to the work it performs. When in use, it is fixed at an angle of about forty-five degrees with the horizon. A modification of this machine is used abroad, wher is called the German snail.

The spiral pump is a contrivance on the same pr ciple. In this the spiral tube is turned on a horizor axis, and the end from which the water is to be charged is connected by an air-tight joint to a perp dicular tube, up which it is gradually forced; by t means water can be carried to a considerable heig This pump was invented about 1746, by Andr Würtz, a pewterer in Zurich, who erected it for a d house on the river Limmat. It consists of a spi tube coiled up on a cylinder, or in any other way t may be thought most secure; one end of this tub open, and at every revolution dips into the water takes up a certain portion, which, as the scoop ri passes along the spiral, and the air is driven forw to the other end of the tube; to this end an upri shaft is fixed, along which, in the first case, the ai driven, and after a few revolutions of the wheel, wl all the air is expelled, the water taken up at the ot end is also forced. These machines seem, in first instance, not to have been much employed. 1778 they were erected at Florence, the tube be coiled on a cylinder. In 1784, one was erected Archangelsky, near Moscow, which raised a hogsh of water in a minute to the height of seventy-f feet, and through a pipe 760 feet long. The o practical difficulty experienced in constructing th machines, is in making the joint on which the sp tube revolves, water-tight. It is not well underst whether a cylindrical or a square tube is best. though the spiral pump is not much in use, it considered by many, to be a very powerful engine its intended purpose.

Another contrivance for raising water a short tance, is called the throwing-wheel or flash-wheel. is generally worked by a windmill, and employed draining land; it consists of a kind of paddle-wh by means of which the water is flashed or thrown an inclined plane, so as to fall into the canal by wl it is discharged.

THE inventive powers of man are not, simply, limited: difficult to prove that he possesses aught but the tale varying that which has been invented by the Creator, recombining those inventions into new groups; being t in reality, but a copyist. He has often attempted to de new animals; but they have ever been compounded the parts of known ones: while, where his novelties l been greatest, the anatomist has not been able to su the parts necessary to motion. No botanist invents a plant but in the same manner; yet he receives from na a hundred new inventions without the least surprise. designer of ornaments must have recourse to the same exhaustible source; and when he attempts to improve soon finds that he is compelled to return to his model teacher. Be the painter what he may in poetic talent is but the transcriber of what nature has produced, as excellence consists in selection and adaptation. The equally, notwithstanding the prejudices in favour of invention, is the recorder and combiner of what ex while even his abstractions are but analyses of nat There is but one inventor: it is the Omnipotent, who invented all things.—MACCULLOCH.

THERE is a species of humming bird in the East, *troch minimus*, so very small, that the ladies of those countri which it is found, not unfrequently, on account of transcendent beauty and splendour of the tiny creat wear the dead bird for an ear-drop. It feeds almost cisely like insects, on the refined nectar of plants, whil the wing. It has a missile tongue. When captured, delicately organized little creature expires almost insta

* See *Saturda Magazine*, Vol. XI., p. 197

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ON STAINED GLASS WINDOWS.

LEGEND OF SAINT ROMAIN, IN STAINED GLASS.

Among the splendid monuments of Gothic architecture, constituting, as they do, the pride and the glory of the middle ages, we find all those arts which are subsidiary to the one great object of erecting a noble edifice in a state of great perfection. Carving of wood, or cutting of metal into ecclesiastical ornaments; inlaying with gold, silver, and precious stones; sculpture; painting; organ-building; the composition of church-music; and the staining of glass; these were a few of the means by which religious communities contributed to the imposing splendour of cathedrals and churches, and of the offices performed therein. We will not stop to inquire whether that great boon to humanity—the Reformation,—was so far an exception to all other human blessings, as to be altogether unalloyed with some circumstances which may excite regret: all we wish to observe on this point is, that since the Reformation, Gothic architecture and its subsidiary arts have greatly declined: it has even been asserted, that the art of glass-staining fell into such general disuse that at the beginning of the last century it was considered as an obsolete and irrecoverable art. This assertion has been made over and over again; but, availing ourselves of undeniable sources of information, we shall find that there are no good grounds for the charge; since at the very time when the art was considered as lost, some of the finest stained glass windows were painted, from 1616 to 1700; and others by Jervis Forrest, up to 1785.

In proceeding to notice these beautiful productions which

> Shed their many-coloured lights
> Through the rich robes of eremites and saints,

we propose to divide the subject into three parts. We shall, *first*, offer a brief account of the history of the art; *secondly*, an account of the processes employed by the glass-stainer; and, *thirdly*, a notice of some of the most celebrated windows which adorn the venerable buildings of our own country, the pre-

servation of whose pure faith is the object of every rightly-constituted mind.

Among numerous contradictory statements respecting the manufactory of stained glass among the moderns, we cannot but refer to the information afforded by an examination of the literary and architectural remains of antiquity. We find that the Romans excelled in the art of fabricating gems and artificial stones, the transparency, the lustre, and the colour of which were greatly admired. They seem to have had greater difficulty in producing colourless glass; for we read, that the emperor Nero paid 6000 sestertia, or about 50,000*l.* of our money for two small drinking-cups with handles, the chief excellence of which consisted in their being colourless. The glass in common use was of an inferior description; it was generally thick, of an opaque white, and often of a blueish colour. In the reign of Tiberius a company of glass-manufacturers established themselves in Rome, and dwelt in a street near the Porta Capena: but the articles manufactured at this place appear to have been few in number, and poor in quality. In the time of Tiberius a curious discovery is referred to, of an architect who had been banished from Rome, in consequence of having incurred the displeasure of the emperor; but having discovered a malleable or ductile glass, he thought to propitiate the emperor by an exhibition of his skill. The artist appeared before him, bearing a glass vessel which he dashed upon the ground without its being broken. The blow merely distorted the shape of the vessel, which the artist remedied by hammering it again into shape, as if it had been made of brass. The emperor, however, instead of rewarding the artist, ordered him to be put to death, remarking, that such a discovery would, if known, tend to make gold of no more value than common clay. This story is variously related, and, if true, proves that the artist made a discovery of which the world is yet ignorant; although an artisan in the time of Louis the Thirteenth is said to have presented the Cardinal Richelieu with a bust made of *ductile* glass; but the minister, with great simplicity, forbade the revelation of the processes by which it was made, fearing that its introduction would tend to injure the glass-manufactories of France.

The ancient Egyptians were doubtless well acquainted with the art of glass-making. Glass beads and other glass ornaments neatly made and beautifully coloured, are found among the ornaments of mummies, which are known to be more than three thousand years old. The Phœnicians were, at an early period, celebrated for the excellence of their glass, which at one time was sold in Rome for large sums. The cups and sepulchral urns which adorn many of our museums, prove a great skill in glass-blowing, and display a delicacy of workmanship not excelled by modern art. The celebrated Portland vase in the British Museum is composed of very deep blue glass, with figures of a delicate white enamel raised on it in relief. This splendid specimen of ancient art was found in the tomb of Alexander Severus, who died A. D. 235.

We find coloured glass beads and amulets among the Druidical remains of this country, whence it has been argued by some antiquaries, that the art of glass-making was known in Britain before the invasion of the Romans. This, however, is subject to great doubt, for these beads and amulets are of admirable workmanship, and beautifully coloured, so as to imitate gems and precious stones. The most probable theory of their introduction into Britain at this early period is, that the ancient Britons procured them from the Syrians, who visited the island in the way of trade, and bartered them in the same manner as we do at the present day with the South Sea islanders, who, in common with most rude nations, delight in toys and trinkets. However, it is quite clear that the ancient Britons were abundantly supplied with these glass ornaments, and that they connected them with their religious observances at a period long anterior to the Roman invasion, as they are found in barrows of a much older date. A large quantity of them have been found in the barrows which are so numerous on Salisbury Plain.

Druidical glass rings, too, have been found, which, according to popular superstition, have a curious origin: they are said to have been produced by "snakes joining their heads together and hissing, when a kind of bubble like a ring was formed round the head of them, which the others, continuing to hiss, blew on, till it came off at the tail, when it immediately hardened into a glass ring." A person finding one of these snake-stones was deemed fortunate and happy. They seem, however, to be nothing more than means employed by the Druids to deceive the vulgar: they are generally of a green colour, but some of them are blue, and a few are variegated with streaks of white, red, and blue.

Such, then, are a few notices of the art of staining glass chiefly with reference to the production of artificial gems and precious stones. It is very probable that the art of staining or painting on glass is coeval with the art of glass-making for domestic purposes. It is very difficult to make colourless transparent glass; the materials employed are generally such as will produce colour, and the idea doubtless occurred to the earliest makers that glass with a pure homogeneous stain might be more easily made than colourless glass, and would be more ornamental: but to produce glass upon which are traced figures of men, animals, foliage, and general ornaments, was a far more difficult undertaking. It bespeaks a time when great skill and knowledge in chemistry and art was attained. No wonder, then, that the first essays were rude both in design and execution. We find among the earliest attempts to produce pictures of coloured and transparent glass, certain specimens composed of pieces of glass clumsily joined together by a vein of lead run upon the back of the picture, precisely at the junction of pieces of variously-coloured glass, so arranged as to produce the desired figure of a man, &c.

At the time of this mode of manufacture, the glass pictures of the ancients were probably unknown. Modern research has offered to our notice some wonderful instances of ancient skill. Winckelmann speaks of pictures formed by means of delicate glass fibres of various hues, which being fitted and adjusted together with great nicety, were united by fusion into a solid mass.

About the ninth century, when so many of the splendid ecclesiastical edifices were erected on the continent, we find frequent mention of the art of glass-painting. But for a long time the painted windows used in cathedrals were merely painted on the surface; the art of staining the glass itself by fusion being unknown until the beginning of the fifteenth century. This great improvement is said to be due to a painter of Marseilles; but the French throw the date of the invention several centuries back, and, with their accustomed vanity, claim not only the invention, but most of the improvements in this beautiful and difficult art. However this may be, it is certain that the French have produced some admirable specimens of glass-painting. Our frontispiece represents a portion of a large window in the

church of St. Godard at Rouen. This is a production of the sixteenth century, and is a masterly performance, whether as regards the design of the artist, or the work of the glass-stainer. We shall presently speak of the legend which this window commemorates.

In our own country, up to the time of King John, stained or painted glass was imported from Italy. In the reign of Henry the Third, a few notices of the construction of painted windows occur. In the time of Henry the Fourth, we find the name of John Thornton, of Coventry, a glazier and glass-stainer, who was employed to paint the eastern window of York Cathedral. The terms of his engagement were as follows: four shillings per week of regular wages, because he was a "masterlye workeman." If he abided by his contract to finish the work in three years, he was to receive over and above the weekly allowance, for each year, one hundred shillings; and at the completion of the work, if the dean and chapter of York approved thereof, he was to receive the further sum of ten pounds.

From this period to the time of the Reformation, many excellent glass-stainers appeared in England. That great event tended to check the progress of art in this country, but did not, as is generally supposed, render the art of glass-staining obsolete. The following is a list of the most eminent English glass-stainers ranged alphabetically, with a slight notice of their principal works.

Bachler, a painter on glass of the last century.

Beckwith. To this skilful artist is due the magnificent window of Arundel Castle, representing King John granting the Magna Charta.

Collins, an eminent artist of our own time, who has executed some admirable works in some of the French cathedrals.

Egginton, F., in 1794, repaired the fine window representing the Last Judgment, in the chapel of Magdalen College, Oxford, and executed several noble windows in the same chapel. He also executed windows for All Souls' College and Windsor Castle. He died in 1805.

Forest, pupil and assistant of Jarvis.

Giles, Henry, painted the eastern window of the chapel of University College, Oxford, representing the Nativity. The gift of Dr. Radcliffe.

Godfrey, R. S., executed a splendid work at Paris in 1769, which is said to surpass the works of the old stainers.

Jarvis painted the altar-piece in St. George's Chapel, Windsor, after the design of West, representing the Resurrection.

Jervais, in 1777, painted the large western window of New College, Oxford, after the designs of Sir Joshua Reynolds.

Linge, in 1636, painted the windows in the chapel of Queen's College, Oxford, and in 1641 those of University College Chapel. Those in the chapels of Wadham and Baliol Colleges were also executed by him.

Marlow was also employed about the windows of All Souls'.

Olivier, Isaac, in 1700, at the age of eighty-four years, executed the window in Christ Church, Oxford, representing Peter delivered from Prison by an Angel. Professor Buckland says that the colours of this work are changed by time.

Pearson, in 1776, after the designs of Mortimer, painted the magnificent window of Brazen Nose College.

Peckitt, of York, from 1765 to 1774, was engaged on the windows of New College Chapel. The colours in these works are now greatly changed.

Picket, in 1762, executed a fine window for Lincoln Cathedral.

Price, William, at the beginning of the eighteenth century, executed several works for the colleges at Oxford. He was succeeded by his son.

Such, then, is a list of the principal English glass-stainers. A host of splendid windows executed by them, sufficiently attests that the art has been cultivated with success in this country, although many of the continental writers deny that the English ever did or could cope with continental artists. In a future article we propose to examine in detail a few of the finest specimens of stained glass windows due to English workmen. To illustrate the present brief sketch of the history of the art, we have chosen our frontispiece from a work of the old stainers, to express, as well as can be done in the absence of the splendid transparent colours of the original work, the masterly skill of the old artists. There are some fine windows in the churches of Rouen, illustrating many of the legends peculiar to the faith of the church of Rome, and although we by no means approve of the subjects which these windows are intended to illustrate, yet we may be allowed to speak of them merely as works of art in terms of praise.

The subject of the legend which these windows commemorate is a passage in the life of St. Romain, who filled the episcopal chair of the cathedral of Rouen. Many wonderful stories are related of this prelate. It is said that in his time a frightful winged dragon devastated the neighbourhood of Rouen, and indulged, after the approved fashion of such monsters, in sundry feasts on human beings, &c. St. Romain determined to rid the country of this scourge, and after many snares and traps had been set and laid in vain, he determined to go in person to the forest-haunt of the monster. He took with him two criminals, one of whom was sentenced to death, to assist him in the chivalric deed. As they drew near the spot, the condemned criminal fled at the sight of the dragon, (see frontispiece:) but the other criminal, taking the girdle of the holy man, approached the monster. At the sight of the girdle it became "as gentle as a lamb," submitted to be bound therewith, and was thus conducted to the prelate, who caused it to be taken into the market-place of Rouen and publicly burnt. Its ashes were then thrown into the river Seine.

Ignorance only could ever have dictated the sentiment that anything was made in vain—that ignorance which leads its victim to believe that he is the only object on which the good gifts of Providence should have been lavished, and, finding things in the universe which he can neither understand nor make use of, impiously to deem them useless, and made without a purpose. But he who considers the myriads of beings, besides those of his own race, which are nourished by the hand of Providence, and the thousand purposes to be worked out in the great laboratory of nature, of the very existence of which, much more their need and means of fulfilment, he is ignorant, will never be hasty to conclude of anything, that it exists "in vain." It were strange indeed, if the Father of creation should reveal all his purposes to one of his feeble creatures, and teach his deepest mysteries to him, to whom his own existence is an inexplicable mystery. Science never fails to teach him who pursues it in the love of it, more and more to mistrust himself; and the further onward he pursues its paths, the more insignificant does he feel himself to be, as he sees its interminable fields spreading wider before him, beyond the very borders of which he does not seem to have progressed.— ?

What Pleasure it is to pay One's Debts!—I remember to have heard Sir Thomas Lyttleton make this observation. It seems to flow from a combination of circumstances, each of which is productive of pleasure. In the first place it removes that uneasiness which a true spirit feels from dependence and obligation. It affords pleasure to the creditor, and therefore gratifies our social affection. It promotes that future confidence, which is so very interesting to an honest mind: it opens a prospect of being readily supplied with what we want on future occasions: it leaves a consciousness of our own virtue: and it is a measure we know to be right, both in point of justice and of sound economy. Finally, it is the main support of simple reputation.—Shenstone.

420—2

ON WRITING MATERIALS.

No. IX.

ON SEALING WAX.

THE practice of employing seals on letters and other written documents, has, like most other customs of general adoption, undergone many changes and gradual improvements. The purposes for which they have been applied, the material of which they have been formed, the devices impressed upon them, and the mode of fixing them to the parchment or paper to which they are to be attached, have all been subject to many mutations,—a description of a few of which may not be without interest to the general reader.

In France, the custom in early times was, to seal instruments and other documents, instead of signing them; as appears from innumerable ancient charters which are not signed at all. The reason of this custom was, that in those days very few people were able to write; scarcely any one, indeed, could either read or write but clerks; and the custom continued till the times when learning made its way among them, although the reason for doing so had ceased to operate.

In earlier times than those of which we have just been speaking, however, the affixing of seals to written documents was a common practice. The material employed for this purpose by the Egyptians, Romans, and other ancient nations, was a kind of earth, known as *terra sigillaris*, or sealing earth. The Egyptian priests bound to the horns of the cattle, which were fit for sacrifice, a piece of paper, stuck upon some sealing earth, on which they made an impression with the sacred seal; and such cattle only could be offered up as victims. An allusion to the use of sealing earth is made by Lucian, in a passage where he speaks of a fortune-teller, who directed that those who came to consult him, should write down on a bit of paper the questions they wished to ask, to fold it up, and to seal it with clay or some similar substance.

One of the mythological tales of the ancients turns upon the employment of an earth as a material for seals. A Sybil received a promise from Apollo, that she should live as long as she did not see the earth of the island Erythrea, on which she lived. To avoid the impending liability of death, therefore, she quitted the place, and retired to Cumæ, where she became old and decrepit. But on one occasion she happened to receive a letter sealed with Erythrean earth, upon looking at which she instantly expired.

Leaving the realms of fiction, however, there is a curious circumstance related, by means of which Cicero was enabled to prove the authenticity of a document by the seal attached thereto. In a legal contest between two individuals, two contradictory documents were produced, each of which purported to have come from Asia; but Cicero proved that the one which he produced was the genuine document, from the circumstance that it was sealed with sealing earth, as was customary in Asia; whereas, the document produced by the opposing party was sealed with wax, a practice only adopted by the nations of the West, and therefore pointing out the document as surreptitious.

Earth, such as we have described, seems to have been employed for sealing by the emperors of the East; for we are told that at the second council of Nice, a certain person defended the worship of images, by saying, that no one believed that those who received written orders from the emperor, and venerated the seal, worshipped on that account the sealing earth which had been applied to the paper.

The employment of earth for these purposes was in after times superseded by that of flour paste, with which monarchs used frequently to seal their letters. There was also employed a composition called *maltha*, which appears to have consisted of pitch and wax, mixed in certain proportions. Before the time of William the Conqueror, the English did not seal with any substance in a soft state, but only made a golden cross on the parchment, and sometimes an impression on a piece of lead, which hung to the grant or other document by a silken thread, and was deemed a sufficient proof of the tenability of the grant, without either signing or witnesses.

Another substance was, however, gradually introduced as a material for seals, and soon usurped the place of most of those formerly in use. This was wax. Wax has the property of easily melting by the application of heat, and of again solidifying; and, therefore, presented a useful substitute for the earth formerly employed, which must necessarily have been liable to crumble to dust. Yellow wax was first employed, as being most readily obtained; and after a time white wax was also used. Then came various attempts, in the fourteenth century, to give to the wax fanciful colours of different kinds: sometimes green, at other times black was the prevailing colour. The attempts to produce blue wax were, at that period, and for a long time afterwards, unsuccessful; for when a vegetable blue-colouring substance was mixed with the wax, the resulting tint was always green; and the mineral bodies employed for the same purpose, subsided to the bottom when the wax was melted, instead of combining with it. This circumstance gave a very questionable value to a grant which the Emperor Charles the Fifth made to Dr. Stockamar, of Nuremburg, in 1524; which was, the privilege of using blue seals in wax.

Soft wax for sealing, such as we here allude to, is made in our own day in the following manner:—One pound of bees' wax, three ounces of turpentine, and one ounce of olive oil, are put into a proper vessel over the fire, and allowed to boil for some time, when the mixture will be well incorporated, and fit to be formed into rolls or cakes for use. To colour such soft wax, an ounce of any one of the colouring substances of which we shall presently speak, must be stirred in while boiling, till thoroughly incorporated with the wax. By pouring the melted soft wax into cold water, it is brought to the requisite consistency to be formed into the rolls or cakes. But before this is done, the wax is sometimes perfumed: this is effected by adding to every pound of wax, an ounce of gum benjamin, a scruple of oil of rhodium, ten grains of musk, five grains of civet, and five of ambergris. These various scents are rubbed up with the oil, and sprinkled on the wax while in a warm state.

We have still to speak of the real sealing wax of modern times; a substance which affords us one instance among many, of the misapplication of terms. No wax whatever is employed in this substance indeed, if wax were employed, the substance would never assume, after being melted, the hard and brittle character which it presents to us.

There are many contradictory accounts of the invention of sealing wax: neither the date of its discovery, nor the name of the discoverer, being well agreed upon. Some have supposed that it was first prepared in the East, from the circumstance that the lac, which is its principal ingredient, is an easte[rn] product. Beckmann says, that in the collection of curiosities in the university of Gottingen, are two sticks of sealing wax, which Professor Butner procured from Constantinople, under the name of *Turkey*

wax: they are angular, bent like a bow, are neither stamped or glazed, and are of a dark but pure red colour. There are in the same collection two other sticks which came from the East Indies, and which are straight, glazed, made somewhat thin at both ends, have no stamp, and are of a darker and dirtier red colour. All these four sticks seem to be lighter than those made at the present day, and do not appear to acquire so strong an electrical excitation by rubbing.

One account of the introduction of sealing wax into common use, is as follows:—Francis Rousseau, born near Auxerre, in France, travelled through Persia, Pegu, and other parts of the East, by which he acquired considerable knowledge of the manufacturing processes of the East. Having, while he lived at Paris as a merchant, during the latter years of the reign of Louis the Thirteenth, lost all his property by fire, he entered on the project of preparing sealing wax from gum lac, (as he had seen it prepared in India,) in order to maintain his wife and five children. A lady of the name of Longueville made this sealing wax known at court, and persuaded Louis the Thirteenth to use it: after which it was purchased and used throughout all Paris. By this article, Rousseau, before the expiration of a year, gained 50,000 livres. It acquired the name of *Cire d'Espagne,* (Spanish wax,) because at that time a kind of gum lac, which was prepared in an inferior way, was known as *Cire de Portugal,* (Portugal wax).

Sealing wax, however, was used in Europe long before this period, for there is a letter in existence, dated as early as August 3, 1554, which is sealed with this modern species of sealing wax. We have here an instance of the difficulty of fixing the date of inventions or discoveries.

This useful material is made of gum lac, melted and prepared with resin, and coloured with pigments of various hues, of which, however, the prevailing one is red. The hard red sealing wax is made by mixing together two parts of shell lac, one part of resin, and one of vermilion, all in a powdered state. They are then melted over a slow fire, and when they appear thoroughly incorporated, are poured into moulds either ornamental or plain, or else they are rolled out into the form of sticks. In the latter case the soft mass is put on a copper-plate or on a stone, and rolled with a board lined with copper or block tin, to the required length and thickness. The polish or gloss is given to the sticks by exposing them to a fire. For this purpose a furnace or stove is used, somewhat resembling a pail, with bars at the bottom for holding charcoal, and notched at the top of the sides for putting the sticks of wax over the fire. In this manner the sticks are conveniently turned about till the wax is so melted on the surface as to become smooth and shining. Hard sealing wax may be formed into balls, by putting a proper quantity on a plate, and when made into a round form, rolled with the board till it becomes smooth.

Seed lac may be substituted for the shell lac, and instead of resin, boiled Venice turpentine may be employed. There is a coarse kind of sealing wax which may be made by mixing two parts of resin and of shell lac, vermilion and red lead, in the proportion of one vermilion to two of red lead. The vermilion and shell lac are both frequently omitted when cheapness is an object; but the wax thus made is of a very inferior kind.

The best black sealing wax is prepared as above described, except that ivory-black is substituted for the vermilion, and in the commoner kinds, lamp-black.

Coloured sealing wax is prepared in other respects in the same way, only altering the colouring matter according to the tint required. For green wax, instead of vermilion, powdered verdigris is employed: for a brighter green, distilled or crystals of verdigris: for blue, powdered smalt: for light blue, verditer, or a mixture of verditer and smalt: for yellow, masticot; or for a brighter tint, turbith mineral. The purple wax is made like the red, only lessening the quantity of vermilion, and taking a larger or smaller proportion of smalt, according to the required shade of colour.

Most of the cheap sealing wax that is hawked about the streets, is disguised so as to assume the appearance of good wax. The sticks are prepared from the coarsest and cheapest materials, and then covered with a very thin coat of the best sealing wax. This is done by warming the sticks of inferior wax, covering them with the best wax in a state of powder, and then melting this powder by the application of heat.

Such, then, is a short view of the circumstances attending the introduction of sealing wax, or more correctly, sealing resin, and of the mode by which it is prepared.

WHAT IS A COAL-MINE?

A COAL-MINE resembles in some degree a stone-quarry, or a series of stone-quarries, but it is necessary to suppose them to be worked at such a depth as not to be exposed to the day, and therefore requiring pillars of the stone to be left undisturbed, for the purpose of supporting the strata lying above them; through which strata a shaft or pit is sunk into the mine to open it out, to allow the workmen to enter into and depart from it, and to permit its produce to be raised to the surface. It is a scene of great activity, men and horses are kept almost constantly at work; here also are light rail-roads, and trucks, and sometimes steam-engines, for carrying the coal from the place of working to the pit or shaft.

The men work by what are termed "shifts," or a gang, one gang taking the "day-shift," another the "night-shift;" thus the mine is kept at work night and day, excepting on Sundays, pay-days, and holidays. The men "come to bank," or ascend the pit and go to their houses when not at work, and are remarkably cleanly, washing themselves carefully whenever they leave work. The horses are sent to bank only when it is deemed necessary to give them a run out, and this is very seldom; they are provided with good stabling below.

The danger of working in coal-mines is sometimes considerable, and chiefly arises from the inflammable gas contained in the coals, from water collected in old workings, and from the falling of the roof, or stone which is always found above the coal. When fissures occur in the coal, they are generally filled with the gas, and on the fissure being pierced, the gas issues forth into the workings, and if not observed will take fire at the lights of the miners, and explode, producing sometimes most dreadful effects. After the explosion, what the miners call "choke damp" comes on, and those who may have escaped the "blast," or explosion, frequently fall victims to the choke-damp. Some strata, or seams of coal, give out gas from all parts, and are the most dangerous to work in.

To enable the miners to work in such places, they use a lamp covered with fine wire-gauze, called the *safety lamp,* which will burn in the foul air, without causing an explosion until the wire of the lamp becomes red-hot. The lamp serves also to warn the

miner of his danger from foul air, as on coming in contact with it, the flame dilates and changes colour. In places where the air is not so foul, the mine is frequently lighted up with common lamps, and by the men carrying candles. The different shafts of a mine are likewise used for the important purpose of ventilating it. By lighting a large fire at the bottom of one shaft, a quick and powerful upward draft is produced; to supply the vacuum thus created in the mine, a current of fresh and cold air rushes down the other shaft. A circulation of air being thus secured, the fresh air is, by means of trap-doors and other contrivances, conducted into every part of the mine where the men are working, before it is permitted to escape at the "upcast" shaft, or that where the fire is; the other is called a "downcast" shaft.

In digging, the miners meet with many springs, some of which are possessed of strong saline properties. Sometimes the miners pierce strong springs, or old workings, which during many years have been reservoirs for water, when the water rushes into the mine with great force, and drowns the men. The water must then be got out of the mine before the working can proceed. This is done by vast pumps, worked by steam-engines; one stroke of which will raise as much water as five hundred men could pump out. Whilst sinking a pit recently, in the county of Durham, a feeder of water was encountered which required the engines to pump upwards of four thousand gallons in a minute.

Where the roof of the mine is bad, it is supported with timber. Portions, however, sometimes fall before their weakness is discovered by the miners, not unfrequently causing death. Accidents of this kind are, however, from their nature, limited in their fatal consequences; and they sometimes are the occasion of most singular hair-breadth escapes. If the roof fall when the mine is foul, and damage any of the lamps, then there is great risk of an explosion. Some explosions are accounted for in this way.

The depth of "some" of the mines should be stated at "upwards of fifteen hundred feet." One is 1700: 1000 and 1200 feet are now frequent.—Say 170 to 200 fathoms.

THE METEOR.

A SHEPHERD on the silent moor
Pursued his lone employ,
And by him watched, at midnight hour,
His loved and gentle boy.

The night was still, the sky was clear,
The moon and stars were bright;
And well the youngster loved to hear
Of those fair orbs of light.

When lo! an earth-born meteor's glare
Made stars and planets dim;
In transient splendour through the air
Its glory seemed to swim.

No more could star's or planet's spell
The stripling's eye enchant:
He only urged his sire to tell
Of this new visitant.

But ere the shepherd found a tongue,
The meteor's gleam was gone;
And in their glory o'er them hung
The orbs of night alone.

Canst thou the simple lesson read
My artless muse hath given?
The only lights that safely lead
Are those that shine from heaven.

One far more bright than sun or star
Is lit in every soul;
To guide, if nothing earthly mar,
To heaven's eternal goal!—BARTON.

RESISTANCE OF PLANTS TO THE WINDS.

THOUGH the uses of the winds have often been pointed out, I know not who has remarked on that beautiful balance of force and resistance by which the velocity of the atmosphere, or uniting to this the appointed gravity of that body, its momentum, is kept within the bounds necessary to the safe existence of the vegetable world. It must not be said, as it has often been asserted of creation, that this limit of force was contingent on the constitution of the atmosphere and the moving powers; and is therefore a necessity, not the result of design. There are hurricanes, as permitted evils, or appointed variations for special ends; and if they are among the usual exceptions to what we deem a perfect order of things, so do they prove that such forces might occur more frequently, or act perpetually, had it been ordained or permitted. But to have done this would have been to destroy the vegetable races, or else to demand the construction of stronger ones, endued with the necessary resisting power. And in this is seen the balance in question: it is an adaptation made in wisdom, not a chance; while if we compare the apparent feebleness of structure so frequent in plants, with the extent of exposure and the enormous forces to which they are so often subjected without injury, we cannot fail to be interested in the facts, and in the means by which these compensations are effected.

Those facts are open to every one. There is no tree so large, no plant so humble and tender, as not to resist the strongest gales; with exception of those rare excesses which form parts of the appointed destructive powers of creation. The tree is rarely broken, more rarely uprooted; scarcely does it lose the tenderest branch, when bending for days to the blast: and even the leaf, attached by a slender stem, and destined to fall at no distant day, defies the storm while its appointed office is required. The flexible and feeble rose-bush is tormented by the winds as if it would be dispersed in fragments, yet scarcely a petal is displaced till the time approaches when it would have fallen without a touch. It is intended that they should aid in scattering the seeds of plants: yet never perhaps was an unripe one detached by the utmost severity of the gale, tender as its attachment may be, tender as we know it to be in the case of the dandelion. No one, knowing the nature of these parts in plants, and not knowing these facts, could have expected such resistance: it is only the experience of the cultivator which tells him, that neither will his corn-stalk be broken nor its seed dislodged by aught less than the hurricane or the whirlwind.

All this is effected with the utmost facility, not through strength but through weakness; by yielding not by resistance. In lieu of that which could not be granted, the parts of plants have been endowed with flexibility and elasticity, in addition to such tenacity as was admissible: they are the corrective and compensating power, and the result shows that the adaptation is perfect; while we cannot doubt the design, when we find that elasticity, one of the most beautiful and mysterious of the laws of matter, intended not only for evading force, but for equalizing and continuing motion, is diffused through the vegetable world, wherever it can serve this purpose, and no where else; effecting the ends in view, here as elsewhere, through the gradual instead of the sudden retardation of communicated motion.

Should a vane be fixed, it would be broken or bent by the storm: it is free to move, and in this motion it finds a shelter from violence. Thus also is a leaf empowered to place itself in a parallel to the stream

of wind, and thence to defeat or elude its force; while the flexibility and elasticity of the foot-stalk enable it to conform to the most capricious and sudden changes; insomuch that there is scarcely an attachment so feeble as to be insufficient for security. To go through even a small part of the variations which occur in different plants under this principle, to show how, under different degrees of strength and of flexibility, and under differences in form and in the modes of resistance and escape, the desired end is always attained, would far exceed these limits: the student of nature may pursue this investigation through the whole range, down to Nasturtium, (Tropæolum,) where the length and flexibility of the foot-stalk still form an effectual remedy, though the principle for the construction of a leaf and its stem is reversed.

If the herbaceous plant is low that it may find shelter, or otherwise evade the winds, the tall tree is protected by some peculiar construction or qualities. The fir tribe is little flexible or elastic, because this would have interfered with the destined purposes of its wood for the uses of man; but, in compensation, its foliage is such that the winds can pervade it more easily than that of any other trees. Under that of the oak it would have been destroyed: while this tree, reversely, opposing to the winds a solid mass of leaves, is strong both in material and form, although little yielding, The no less full ash bends to the blast, through its flexibility, recovering by its elasticity, while its high tenacity constitutes the remainder of its protection. If the Cactus, Agave, and many similar plants, are neither tenacious, nor flexible, nor elastic, they are strong in form and in structure; the latter resembling that contrivance in bones, by which bulk is produced without weight, and strength without mass of materials. In the vine, and in many more plants; in bryony very remarkably, the tendril does not serve merely as a support; since in curling itself far more than is necessary for that purpose, it becomes a spiral spring, allowing the plant to yield to the winds, and restoring it to its place as their force passes away. It is almost superfluous to point out how the delicacy of the foot-stalks in the panicled grasses, added to the elastic flexibility of the whole stem, defends the flowers from any torments the storm can inflict: while interesting variations will be found in Aira, Agrostis, Briza, and many others, with examples of elasticity in many more, not always exceeded by that of our metal springs. And if, in this tribe, the length and flexibility of the filaments afford singular protection to the anthers, independently of the more direct purpose which they serve, in permitting their contact with the surrounding stigmas, so does the anther, almost every where, afford another example of contrivance subservient to this purpose, if to move, in that articulation which so far exceeds the ball-and-socket joint in freedom, that it almost seems as if no attachment existed. One other circumstance may be mentioned; that which, depending on the sensibility of the vegetable organization, is only called into action when it is wanted; being displayed in the increased action of the tendrils, in the further spreading or growth of the roots, and in that general increase of strength which follows from exposure, very remarkably in the outer trees of a forest.

It must suffice to have thus shown, that in this department of life the Divine wisdom has adapted the resisting powers to the injurious forces, through a great diversity of contrivances, and with a success as perfect as the general intention is unquestionable.

[Maccullocu's *Proofs and Illustrations of the Attributes of God.*]

ELECTRICITY.

No. VI.

Electrical Experiments.

The electric spark is an object of peculiar interest to all classes of observers, especially to philosophers.

When an electrical machine is in good action, if we bring the knuckle, or a brass ball, near the positive conductor, brilliant sparks, or rather streaks of light, will dart from it; following each other in quick succession, but varying in their colour and form, according to the distance to which they are transmitted. When the spark is received by the knuckle, it is necessary to turn back the cuff of the coat, to prevent the electricity from being conveyed by it from the machine. This precaution is also applicable to other parts of the dress, which should be properly secured whilst conducting all kinds of electrical experiments; for if permitted to get near the apparatus, they will materially interfere with the results.

The best method of investigating electrical light, as it is exhibited when passing through air, is by means of two brass balls, each about two inches in diameter. One of these balls must be fixed to the conductor, at that part farthest from the machine, and the other held in the hand of the operator. The latter ball being placed at what is termed the *striking distance* from the other, and which depends on the size and power of the machine, a spark or flash of white light, tinged at one of its extremities with violet, will pass between them. On gradually separating the balls, the sparks will pass less frequently, and as the distance increases, the violet colour will prevail. If a ball one inch in diameter be substituted for that attached to the conductor, electricity of higher intensity will be obtained, and it will consequently pass through a greater space.

Under these circumstances, and with a twenty-four inch plate machine now before us, the sparks can be made to vary from four to ten inches in length. As their length is increased, they assume a zigzag, and ultimately a forked appearance, exactly resembling lightning; and instead of proceeding direct towards the centre of the large ball (which is held in the hand), they seem attracted by irregularities at various parts of its surface, or probably by particles floating in the atmosphere, but which are too minute to be detected. The colour of these sparks or flashes is fainter in proportion as they are more diffused, changing from violet to deep red.

We have always found the part of the conductor of a plate machine at which the longest sparks can be taken, is at the angle where the piece is returned which carries the steel points. When the machine, to which we just now referred, is in good condition, and the atmosphere favourable, we have no difficulty in obtaining from it, at the part we have mentioned, a rapid succession of sparks, from nine to twelve inches in length. It is also deserving of notice, that the time most favourable for the developement of these sparks or flashes is during the first three or four turns of the machine, immediately after its action has been for a few minutes suspended.

With a cylinder machine the phenomena attending electrical light can be illustrated somewhat differently from the manner we have described; by which we learn that the forms as well as colours of the sparks are determined (other conditions being the same) by the nature of the electricity; whilst they partake of a mixed character when one substance is positively, and the other negatively, electrified.

Nor must we omit to mention that the size, form, colour, and other attributes of the electric spark,

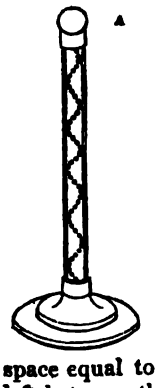
depend on the nature of the substances through which it is transmitted, or upon which it is received; as also on the forms of those substances, and the direction in which the spark enters or leaves them; and whether it merely passes over, or penetrates beneath, their surfaces. Thus, the sparks which pass between the polished surfaces of most of the metals are intensely white; but when communicated by a metal to any part of the human body, their colour inclines to violet. The sparks taken from ivory, box, and some other kinds of wood are red, as they are also from green vegetable substances, from ice, or water, and in some cases from iron. From chalk, and many other minerals, their colour is white, occasionally tinged with yellow; whilst those from loaf-sugar, and gilt or silvered leather, are a beautiful green.

But in many instances these colours are modified by particular circumstances, and by imperceptible gradations become so nicely blended, as to lose all traces of their several peculiarities. This is effected by merely altering the forms, or changing the relative positions, of the substances above enumerated. For instance: if we fix a piece of stout wire (about six inches long, and having a sharp point at one end), upon the conductor, and bring near to it a brass ball, at a certain distance from its point, a rapid discharge of brilliant sparks will ensue; but on slowly withdrawing the ball to a greater distance from the point, the sparks, gradually changing from white to violet, will at length disappear; their place being occupied by detached rays of violet-coloured light. If we now reverse this experiment, fixing the ball on the conductor, and approaching it, at the same distance as before, with the point, there will be only a bright speck or star on the latter; the whole of the electricity excited by the machine being in this case silently and almost imperceptibly withdrawn.

This experiment can be varied in the following manner:—Insert the pointed wire into a piece of glass tube about its own length, and quite smooth at the ends. On presenting one end of the tube, with the point just protruding, to the conductor, and then slowly withdrawing the point, sparks will pass between it and the conductor, within the tube, in the same manner as if a ball were used.

As the influence of points upon bodies charged with electricity will occupy our attention more fully by and by, we shall only remark here, by way of caution, the necessity of avoiding angular and sharp-pointed projections in the preparation of electrical apparatus, the various parts of which, whether of wood, glass, or metal, require to be finished with their surfaces and edges as smooth as possible.

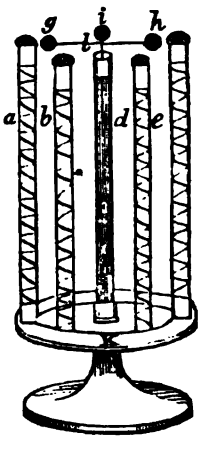
Now let us describe a few, among the many, ingenious contrivances, for exhibiting the electric spark when passing through air, and its effects on various substances which may be placed within its influence.



We begin with the spiral-tube, which is sometimes fitted with a spherical brass cap at each end, and is then intended to be held in the hand, or it can be fixed to a stand, as in the accompanying figure. It is constructed in the following manner:—two glass tubes, one to go within the other, are provided; the smallest being about three-fourths of an inch in diameter, and eighteen inches long, and the other an inch shorter. On the outside of the small tube discs of tin-foil are pasted in a spiral form, a space equal to about the one-fiftieth of an inch being left between them. The smaller tube is made longer than the other, that it may enter the brass cap A, and by means of a piece of tin-foil, be brought into metallic contact with it. The end A being placed at the distance of about an inch from the conductor, on turning the machine a series of beautiful sparks, following each other very rapidly, will pass along the tube, and when the room is darkened will resemble a continuous stream, rather than intermitting coruscations of light.

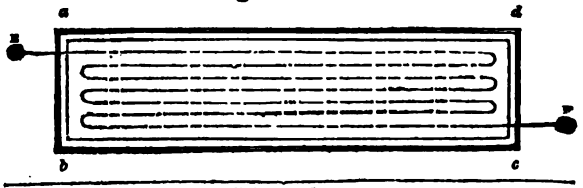
It will of course be understood, that if the discs were in contact, the effect, as described, would not be produced; for electricity is not visible when passing through good conductors; the light, therefore, is occasioned by its forcing a passage across the thin column of air interposed between the edges of the discs.

Here is another piece of apparatus, consisting of five spiral tubes, *a b c* (not seen in the fig.) *d* and *e*, which are arranged around a stand K, on the centre of which is fixed an insulated glass pillar F. At the top of this pillar is a small brass rod, *l*, placed horizontally, to which are attached three brass balls, *g h i*, and underneath the latter ball is a small pivot, on which the rod revolves. The lower extremities of the tubes are in metallic contact, a thin brass ring being let into the stand for that purpose.



The conductor, or, what is more convenient, a jointed arm connected with it, being brought immediately over the ball *i* and the rod *l* set in motion, on working the machine, the rod will revolve with considerable velocity, communicating electricity to each of the tubes in succession, which will exhibit streams of light in a spiral form, and in the dark it will appear as if the tubes themselves were in motion, the illusion being assisted by reflection from the glass pillar in the centre.

Luminous words and figures are also successfully employed in illustrating the properties of electricity. Let *a b c d* be a neat frame of well-seasoned mahogany, containing two plates of glass, of equal size and perfectly flat; on one of the plates narrow strips of tin-foil are pasted, forming an unbroken connexion throughout the seven parallel lines, which extend nearly from end to end of the glass, communicating at one extremity with the brass ball E, and at the other with F. When the paste is dry, the foil is divided by a sharp knife, the separations being so arranged that they may form the word LIGHT, or any other word or device that may be required. The other plate of glass is intended only to protect the tin-foil from dust or accidental disarrangement. The ball E being placed near the conductor, whilst F communicates by a chain with the floor, on passing a succession of sparks through the foil, the word or device delineated on it will appear in luminous characters on the surface of the glass.



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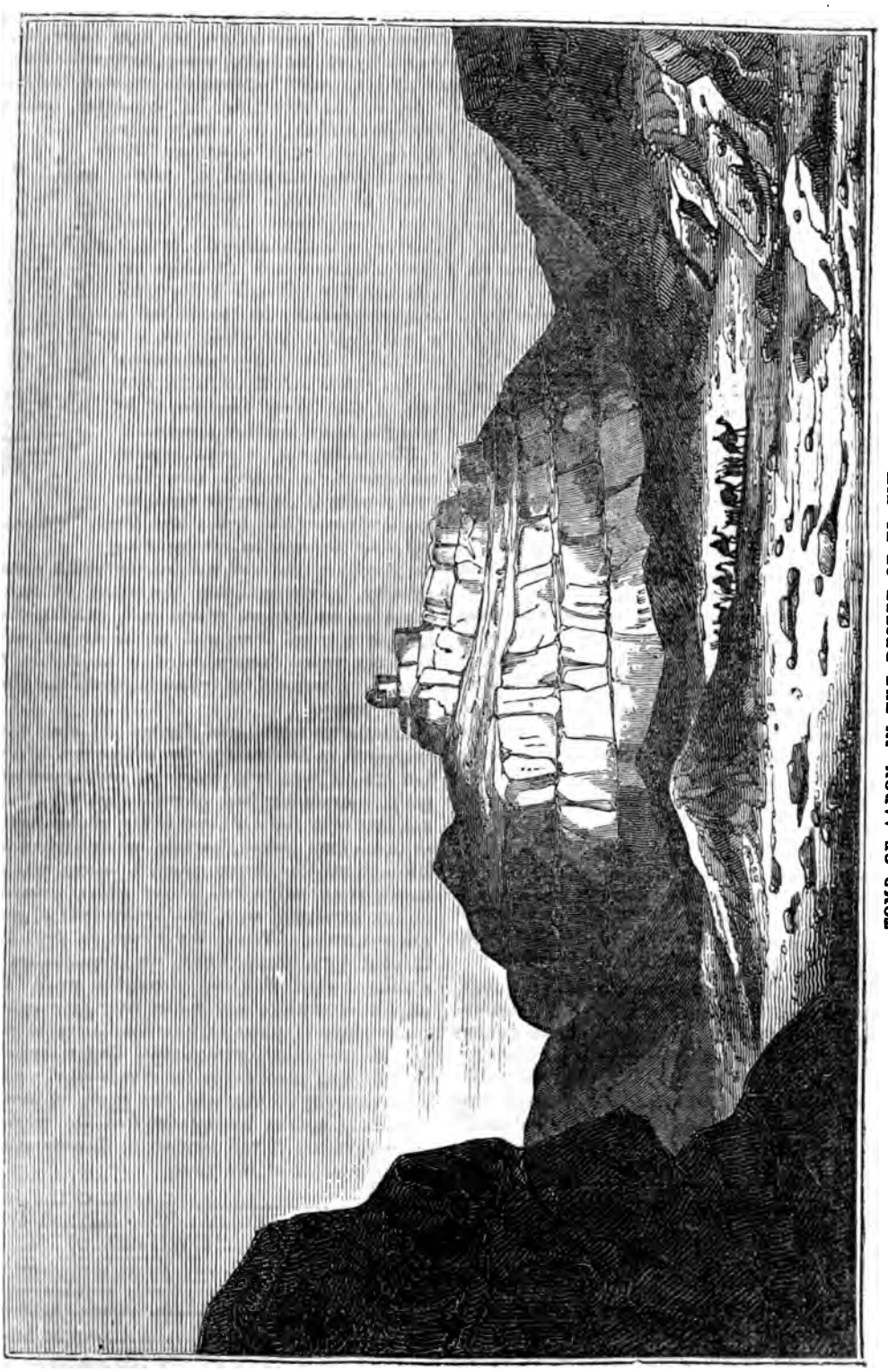


TOMB OF AARON, IN THE DESERT OF EL ZIH.

ILLUSTRATIONS OF THE BIBLE FROM THE MONUMENTS OF ANTIQUITY. No. XXI.

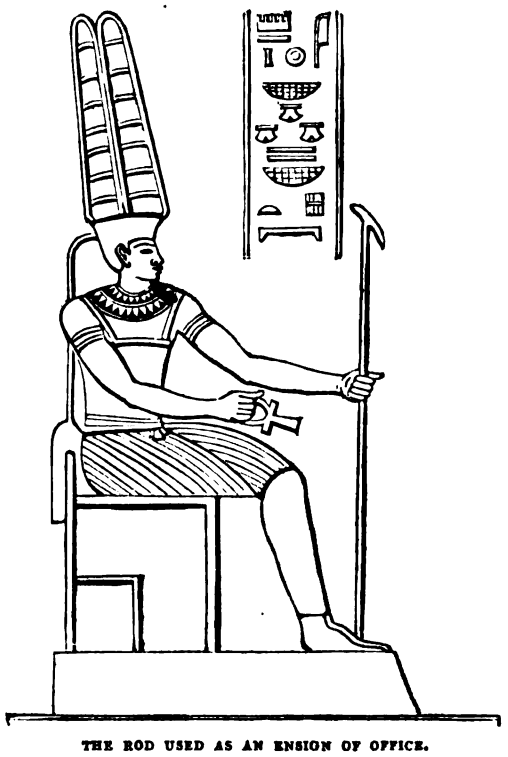
WANDERINGS IN THE DESERT—DEATH OF AARON AND MOSES.

THE ceremonial law of the Jews was directly designed to preserve them as a peculiar people, dedicated to Jehovah their God and King. Their form of government was a Theocracy; the Almighty himself was their sovereign, and He made known his edicts by the authorized interpreters of his will. But it was necessary under such a constitution to take especial care that no pretender should mislead the multitude, as the High Priest delivered the responses from the oracular Urím and Thummím, by which all affairs, religious, civil, political, and military, were regulated; grave evils were likely to occur if there had been any room for doubt as to the person who should have the exclusive right to discharge such important functions. The priesthood was therefore rendered hereditary in the family of Aaron, and the performance of minor sacerdotal duties was restricted to the tribe of Levi. It is sufficiently obvious that the hereditary priesthood was not only an essential element of the Theocracy, but the very bond of union by which all the parts of that constitution were held together. Hence, as we have seen in the preceding article of this series, the revolt of Korah was severely punished, and the sacerdotal privilege of offering incense invested with singular importance. But another miracle was wrought to confirm the priesthood of Aaron, to which it is necessary to direct attention.

The Lord spake unto Moses, saying, Speak unto the children of Israel, and take of every one of them a rod according to the house of their fathers, of all their princes according to the house of their fathers twelve rods: write thou every man's name upon his rod. And thou shalt write Aaron's name upon the rod of Levi: for one rod shall be for the head of the house of their fathers. And thou shalt lay them up in the tabernacle of the congregation before the testimony, where I will meet with you. And it shall come to pass, that the man's rod, whom I shall choose, shall blossom: and I will make to cease from me the murmurings of the children of Israel, whereby they murmur against you. And Moses spake unto the children of Israel, and every one of their princes gave him a rod apiece, for each prince one, according to their fathers' houses, even twelve rods: and the rod of Aaron was among their rods. And Moses laid up the rods before the Lord in the tabernacle of witness. And it came to pass, that on the morrow Moses went into the tabernacle of witness; and, behold, the rod of Aaron for the house of Levi was budded, and brought forth buds, and bloomed blossoms, and yielded almonds. And Moses brought out all the rods from before the Lord unto all the children of Israel: and they looked, and took every man his rod.

And the Lord said unto Moses, Bring Aaron's rod again before the testimony, to be kept for a token against the rebels; and thou shalt quite take away their murmurings from me, that they die not. And Moses did so: as the Lord commanded him, so did he. (Numbers xvii. 1—11.)

The memory of this signal miracle was perpetuated among the Jews not only by the preservation of the rod, but by their coins, for the most common impression on the shekels of Jerusalem was the almond-flowers that budded on the rod of Aaron. From the monuments we see why this peculiar test was chosen; the wand or rod was the official ensign of dignity among the Egyptians like the sceptres of the Greeks, or the white staves used in most modern nations; the heads of the tribes therefore presented to the Lord the emblems of their station, and the singular miracle wrought in Aaron's favour was the strongest reproof of their rebellion and unbelief, and the most signal confirmation of Aaron and his family having been chosen to fill the place of God's ambassadors, and to interpret his commands to the people He had chosen as his peculiar care.



THE ROD USED AS AN ENSIGN OF OFFICE.

So familiar were the Israelites, during their residence in Egypt, with the notion that the rod was the emblem and cognizance of dignity, that they never afterwards disputed the title of Aaron to the High Priesthood. Soon afterwards they had another opportunity of seeing the efficacy which God had given to this ensign of dignity, when Moses, by striking the rock, produced springs of water at Meribah. But on this occasion Moses and Aaron showed a want of confidence in the power and promises of the Almighty, which was the more criminal on account of the mighty miracles that had been so recently wrought in their favour. They were punished by being excluded from the Promised Land, and condemned to die in the wilderness. As the congregation journeyed from Meribah, an unexpected obstacle was offered to their progress: the king of Edom refused to allow the Israelites a passage through his territories, and they were commanded by God not to force their way, but to take a circuitous route by the mountains on the frontiers. The country which they traversed has only been recently explored by the enterprise of European travellers, and though more than three thousand years have elapsed since the Exodus, the country through which they travelled bears many decisive proofs of the truth of the Scriptural narrative. The name of the desert, *El Zih*, or the *wandering*, is a testimony to the wanderings of the Israelites. Laborde, whose travels through that country abound in the strongest confirmations of the veracity of the Pentateuch, says, "The Bible is so concise, but at the same time marked by so much precision and truth, that it is only by close and fixed attention to every word of its statements, that its entire merits can be discovered." This is singularly verified by the existing monument confirmatory of the events recorded to have occurred at Mount Hor.

The Lord spake unto Moses and Aaron in Mount Hor, by the coast of the land of Edom, saying, Aaron shall be gathered unto his people: for he shall not enter into the land which I have given unto the children of Israel,

because ye rebelled against my word at the water of Meribah. Take Aaron and Eleazar his son, and bring them up unto Mount Hor: and strip Aaron of his garments, and put them upon Eleazar his son; and Aaron shall be gathered unto his people, and shall die there. And Moses did as the Lord commanded: and they went up into Mount Hor in the sight of all the congregation. And Moses stripped Aaron of his garments, and put them upon Eleazar his son; and Aaron died there in the top of the mount: and Moses and Eleazar came down from the mount. And when all the congregation saw that Aaron was dead, they mourned for Aaron thirty days, even all the house of Israel. (Numbers xx. 23—29.)

The tomb of Aaron on Mount Hor is one of the most conspicuous objects in the land of Edom; after having remained unknown to Jews and Christians for so many centuries as have elapsed since the death of the first high priest of Israel, it has been discovered again within the last few years, situated in the midst of a land whose inhabitants in ancient times were among the most inveterate enemies of the Israelites, and whose present occupants are wild Arabs equally opposed to the Jewish and Christian faith.

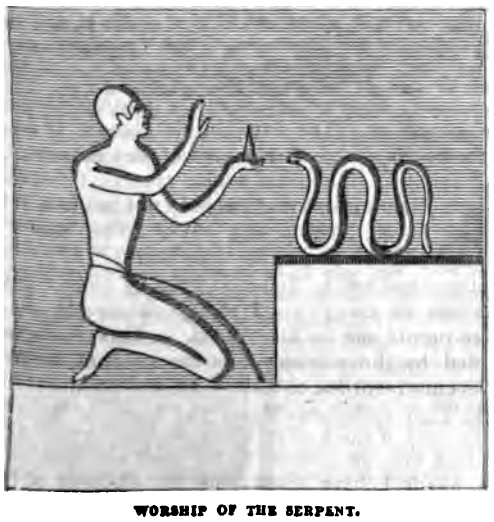
When the days of mourning for Aaron were passed, the Israelites went and encamped at Zalmona, which signifies "the place of the image," a name which it received from the representation of a serpent erected by Moses. The rebellious Israelites once more gave vent to seditious murmurings, and

The Lord sent fiery serpents among the people, and they bit the people; and much people of Israel died. Therefore the people came to Moses, and said, We have sinned, for we have spoken against the Lord, and against thee; pray unto the Lord, that he take away the serpents from us. And Moses prayed for the people. And the Lord said unto Moses, Make thee a fiery serpent, and set it upon a pole: and it shall come to pass, that every one that is bitten, when he looketh upon it, shall live. And Moses made a serpent of brass, and put it upon a pole, and it came to pass, that if a serpent had bitten any man, when he beheld the serpent of brass, he lived. (Numbers xxi. 6—9.)

This lively image of the deliverance of the whole human race from the power of "the old serpent," is a remarkable type of our Great Redeemer, and one to which He himself has distinctly referred.

As Moses lifted up the serpent in the wilderness, even so must the Son of man be lifted up: that whosoever believeth in him should not perish, but have eternal life. (John iii. 14, 15.)

But this memorial of their wondrous deliverance subsequently became a snare to the idolatrous Jews; for the worship of the principle of evil, through fear, under the form of a serpent, was, as we have stated in the first paper of this series, one of the most common forms of idolatrous superstition, not only in Egypt but through the entire East. It is impossible to account for a worship so degrading to humanity, and utterly inconsistent with every suggestion of reason or natural feeling, otherwise than by connecting it with the traditions respecting the fall of man, traces of which are found in the mythologies of all ancient nations. The Jews worshipped the brasen serpent when they sank into the idolatry which had already proved so fatal to their brethren, the ten tribes of Israel. From the general neglect of sacred things, it is probable that the bulk, both of the priests and the people, had forgotten the original purpose and signification of the consecrated image, and had eagerly seized the opportunity afforded by its preservation in the sanctuary, to indulge their insane love for adopting the superstitions of surrounding nations. Hence the brasen serpent was destroyed by the good king, Hezekiah, when he purified Judah from the idols which had been erected during the long period of corruption that preceded his accession to the throne of David.



WORSHIP OF THE SERPENT.

He removed the high places, and brake the images, and cut down the groves, and brake in pieces the brasen serpent that Moses had made: for unto those days the children of Israel did burn incense to it: and he called it Nehushtan. (2 Kings xviii. 4.)

Nehushtan signifies "a piece of brass," and Hezekiah gave the idol that contemptuous name, in order to show that when the brasen serpent had fulfilled the purpose for which God caused it to be made, it possessed no more sanctity or importance than any other piece of metal. This was the more necessary, as nothing has more tended to extend the worship of images, than venerating the relics or memorials of providential events; a snare into which not only the Jews, but several Christian nations have unfortunately fallen.

After the Israelites had conquered the Amorites and several other warlike tribes, a terror fell upon the surrounding nations, and Balak, king of Moab, employed the Midianite prophet, Balaam, to curse them. But Balaam, constrained by Almighty power, was compelled to change his words of execration into benediction, and "bless the children of Israel altogether." The unworthy prophet, however, found more efficacious means to injure the chosen race; at his suggestion Balak directed his subjects to celebrate the festival of Baal-Peor, or the Idol of Lust, whose worship consisted in the most abominable and licentious ceremonies, but which, under various forms, was not only tolerated but encouraged by most of the ancient heathen nations, even when they had made a considerable advance in civilization. The Israelites had probably been acquainted with this form of idolatry in Egypt, for the figure in the following engraving is believed to be one of the deities worshipped with obscene and execrable rites; they therefore yielded to the suggestions of the daughters of Moab, who had been sent to entice them.

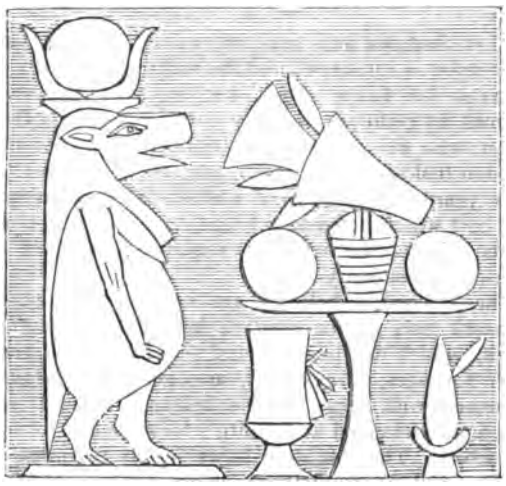
And they called the people unto the sacrifices of their gods: and the people did eat and bowed down to their gods. And Israel joined himself unto Baalpeor: and the anger of the Lord was kindled against Israel. (Numbers xxv. 2, 3.)

The immediate chastisement of the worst offenders averted the vengeance of Jehovah; the false prophet, Balaam, was soon after slain, together with a multitude of the Midianites, who had joined in leading the Israelites into this grievous crime.

Soon after this defection Moses took an account of the people, and found that none were left alive of those who had come up out of Egypt, save himself, Joshua, and Caleb; he then made the necessary regulations for the distribution of Canaan between the

several tribes by lot, and having thus completed his legislation, he ascended Mount Nebo, one of the highest peaks in the chain of Abarim, whence he had a view of the promised land, which he was forbidden to enter. Instead of murmuring at this dispensation, Moses humbly sought directions as to the choice of his successor:

Moses spake unto the Lord, saying, Let the Lord, the God of the spirits of all flesh, set a man over the congregation, which may go out before them, and which may go in before them, and which may lead them out, and which may bring them in; that the congregation of the Lord be not as sheep which have no shepherd. (Numbers xxvii. 15—17.)



IDOL OF LUST.

Joshua was selected by God to lead the Israelites to the conquest of Canaan, and the directions given for his installation are, on many accounts, too important to be omitted.

The Lord said unto Moses, Take thee Joshua, the son of Nun, a man in whom is the spirit, and lay thine hand upon him; And set him before Eleazar the priest, and before all the congregation; and give him a charge in their sight. And thou shalt put some of thine honour upon him, that all the congregation of the children of Israel may be obedient. And he shall stand before Eleazar the priest, who shall ask counsel for him after the judgment of Urim before the Lord: at his word they shall go out, and at his word they shall come in, both he, and all the children of Israel with him, even all the congregation. And Moses did as the Lord commanded him: and he took Joshua, and set him before Eleazar the priest, and before all the congregation: And he laid his hands upon him, and gave him a charge, as the Lord commanded by the hand of Moses. (Numbers xxvii. 18—23.)

In Deuteronomy, chap. xviii. 15, Moses declares,—

The Lord thy God will raise up unto thee a Prophet from the midst of thee, of thy brethren, like unto me; unto him ye shall hearken; According to all that thou desiredst of the Lord thy God in Horeb in the day of the assembly, saying, Let me not hear again the voice of the Lord my God, neither let me see this great fire any more, that I die not.

The modern Jews affirm, that this prophecy was fulfilled by the appointment of Joshua as successor of Moses; but if we attentively consider the divine declaration, made at the time of his appointment, we shall see that Joshua was not only inferior to Moses, but to the generality of the prophets, since he was to have recourse to the *urím* and *thummím* in all emergencies, whereas the former spoke to God "face to face," and the latter were always ready to declare the mind of God to those that came to consult them. In fact, Joshua could not be at all called a prophet without a great abuse of terms, for he was himself subject to direction, and received all revelations of the Divine will through the intervention of the high priest.

Moses, having thus accomplished all the injunctions of Jehovah, addressed the children of Israel, in a most poetic and affectionate recapitulation of the blessings they had experienced, and of the duties they owed to their Benefactor. He died at the advanced age of one hundred and twenty; "his eye was not dim, nor his natural force abated." His sepulchre was carefully concealed, in order that it might not become an object of idolatrous veneration to the Israelites. It is to this that St. Jude alludes in the following passage, which refers to a tradition common among the Jews.

Yet Michael the archangel, when, contending with the devil, he disputed about the body of Moses, durst not bring against him a railing accusation, but said, The Lord rebuke thee. (Jude 9.)

No doubt, a people that worshipped the brasen serpent, would have shown at least equal reverence for the body and tomb of their great legislator, had not both been concealed by the wise precautions of Providence.

SINGULAR MODE OF FISHING IN TYROL.

WHILE travelling along the banks of a small branch of the Inn river, in the Tyrol, with my hammer in my hand, searching for specimens of the rocks and minerals which are found in its bed, my attention was suddenly attracted to the operations of a lad about sixteen years old, who was actively employed in examining the water-worn rocks that lay partly above water in the stream. Every few minutes he struck the rocks heavily with a large sledge-hammer, and then picked up something, and put it into a basket, which he carried at his side. He moved actively, jumping from rock to rock along the stream, and appeared to be very successful in his labour. As he was coming down the stream towards me, I seated myself on a rock, and observed attentively his movements. I supposed at first that he was a brother mineralogist, and as he approached me, I hailed him to learn what success he had in his researches, and what he was so eagerly collecting. To my great surprise I found his basket filled, not with curious minerals, but with small and delicate fishes, resembling in size our common smelt, but in shape and colour they looked more like anchovies. He informed me that they were esteemed a great luxury at Inspruck, and were the most delicate fish of Tyrol. His mode of taking them was the most successful, for he observed that they would not take the hook, and as they concealed themselves close to the sides of rocks, it was difficult to catch them with a net.

It will be easily understood, by any one conversant with natural philosophy, how the concussion given to a rock in the brook was communicated, either directly by the rock, or through the medium of the water, to the fish, whose delicate organization could not sustain its violence, and that they were in this manner stunned, and their sounds or air-vessels being ruptured, they came to the surface, where they were easily taken. I often observed, when a boy, that if a smelt dropped from the hook, at a considerable height, into the water, it was stunned by the shock, and floated upon its back; also that when a fish was discovered close to the bottom, in shallow water, the surface of which was frozen, if a smart blow was struck upon the ice, immediately over the fish, it generally came up to the ice, floating upon its back and dead. We were in the habit of explaining the fact by saying that its air-bladder was broken.

IT is not more evident that the body was made to be improved and strengthened, than that the mind was also made to be improved by knowledge; hence he who learns, if he learns well, not only finds learning easier the further he advances, but understands better what he learns. Science is not arbitrary, or composed of detached and isolated parts; it is one connected series of truths, centreing in the Deity, and embracing the largest and the smallest, the nearest and the most remote, portions of his universe. So he who learns not, or ceases to learn, does not fulfil his destiny—which is, to become acquainted, as far as in his power, with all truth. He can know neither his Creator nor himself; although his greatest happiness depends upon this knowledge.—?

ON BELLOWS.

The bellows is one of those domestic instruments which are so familiar to us that we are apt to forget that there was a time when it did not exist, and that it must have gone through several stages before it arrived at its present excellence. It may not be uninteresting to present to our readers a short account of the contrivances which preceded the use of, and were employed for the same purpose as, the modern bellows.

The most simple bellows is undoubtedly the mouth; since the same mechanism which will direct a stream of air into a flute or trumpet, will, by a different arrangement of the lips and tongue, propel a blast of air into a newly-kindled fire; the object being to supply the fire with a larger amount of oxygen (contained in the atmospheric air,) than will reach it in the ordinary way But although the mouth may, as most persons have probably observed, act as a bellows, yet the fatiguing nature of the process must at an early period have induced a desire to construct a machine for effecting the same object.

There are many remarks scattered among the works of the ancient writers which seem to imply that leathern bellows were known among them; but the information conveyed is not so definite as to deserve much reliance. It appears that in later times, when smelting-furnaces, used in manufacturing districts, had increased in number and importance, the heat of the furnaces was increased by the use of bellows, which seem to have consisted of leathern bags, with a hollow reed inserted at a small opening. After a time metal tubes were used instead of hollow reeds, and the leathern bags became superseded by wooden cases.

As we are accustomed, in the present day, to use bellows in which the edges of the boards are connected by strips of flexible leather, it may seem strange that bellows should have been used which were constructed entirely of wood, with the exception of the nozzle. Yet such was the case. In 1550 an organ-builder at Nuremburg, named Hans Lobsinger, announced the construction of bellows, in which the sides, as well as the top and bottom, were made of wood. No further details are, however, known respecting his bellows. But about 1630, two brothers, Martin and Nicholas Schelhorn, at Coburg, in Franconia, constructed wooden bellows, of which a clearer account has been transmitted. These brothers behaved as inventors are wont to do: they endeavoured to conceal the nature of their invention, until they had reaped an adequate profit by the manufacture.

About the same period, an individual named Louis Pfannenschmid came from Thuringia, and settled at Ottfeld in the Hartz Forest, where many furnaces were at work, and set up business as a wooden bellows-maker. The makers of leather bellows, who previously lived in that place, conspired against him, and swore they would put him to death—a threat which would probably have been fulfilled, had not Pfannenschmid been formally protected by the government. The mode of making these wooden bellows was for a long series of years known only to the family of Pfannenschmid, who continued to make all those used in the Hartz Forest. From Germany these bellows gradually found their way into France.

These bellows consisted mainly of two boxes, or cases, made of fir wood, one of which was a little smaller than the other, so as to be able to be placed within it, and to enclose a body of air between them. At one end was situated a kind of hinge, on which the upper case turned, somewhat in the manner of the lid of a snuff-box. Beyond this hinge was a nozzle, through which a portion of air was forced out, at every downward motion of the upper half of the case.

It is obvious that when the upper half of the case was raised by a handle at one end, the space between the two halves became enlarged, and a greater bulk of air could be contained therein. This air entered at a valve-hole in the lower half, as in the ordinary bellows. As it would have been impossible, however, to make the upper box fit on the lower one so closely as to be air-tight, much air would escape from between the two, instead of passing through the nozzle. To obviate this, moveable slips of wood were placed on the inner sides of the uppermost case, and were so acted on by metallic springs, that they became pressed against the sides of the lower case, so that no air could pass out between the edges of the two cases.

These bellows were sometimes made of a large size, to be used in furnaces; and the end of the handle had facilities for fixing ropes, &c., so as to work the bellows by pulleys, or other similar means. Beckmann, who wrote in the last century, said that these wooden bellows, when well made, would last thirty or forty years, although used almost daily in furnaces. The bolt which acted as a hinge, and the outer side of the edge of the inner box required to be oiled and greased occasionally.

These wooden bellows are now superseded, for domestic use, by the modern bellows with leathern edges, which can be made and sold for a small price; while furnaces, forges, &c., are, generally speaking, furnished with large double bellows, the action of which, as instanced at a smith's forge, may be briefly described. The double bellows nearly resemble the single or domestic bellows in external appearance; but the interior cavity is divided into two parts or chambers by a middle board, similar to the lower board, and furnished also, like it, with an upward-opening valve: these three boards are connected at the edges by leather. The middle board is fixed horizontally; and the nozzle is in communication with the upper compartment, only at the time when air is about entering the lower compartment. This being the disposition of the parts, the action is as follows. When the lower board is raised by the handle, the air contained in the lower compartment is driven through the valve in the middle board, into the upper compartment. The quantity thus forced into this compartment is greater than can escape through the nozzle in the same time; the consequence of which is, that the upper board is pressed upwards, so as to enlarge the capacity of that chamber. Weights are placed upon the upper and lower boards, by which they are borne down, when the upward motion of the handle ceases. As the upper board descends, the air contained in the upper compartment closes the valve in the middle board, and is forced out through the nozzle. During this time, the lower compartment, by the descent of the lower board, obtains a new supply of air; which supply is, upon the lower board being again raised, partly propelled through the nozzle, and partly accumulated in the upper compartment, as before. By this ingenious arrangement, air is forced through the nozzle, both by the upward and downward motion of the handle; whereas in the common single bellows the downward motion is alone effective.

There is a useful form of domestic bellows, which has been lately invented, in which a continuous stream of air is obtained, by turning a handle connected with an ingenious contrivance in the interior.

Ridicule, which chiefly arises from pride, a selfish passion, is at best but a gross pleasure, too rough an entertainment for those who are highly polished and refined.—Lord Kaimes.

AUSTRALIA FELIX.

No. II.

NATIVES ON THE DARLING.

We continue our extracts from Major Mitchell's interesting account of his discovery of Australia Felix.

Two stout natives rudely demanded my pistols from my belt, whereupon I drew one, curious to see the effect, and fired it at a tree. The scene which followed I cannot satisfactorily describe, or represent, although I shall never forget it. As if they had previously suspected we were evil demons, and had at length a clear proof of it, they repeated, with tenfold fury, accompanied with hideous shouts and demoniac looks, crouching and jumping to a war-song they set up, all their gestures of defiance; spitting, springing with the spear, and throwing dust at us, as they slowly retired. In short, their hideous crouching, measured gestures, and low jumps, all to the tune of a wild song, and the fiendish glare of their countenances, appropriately black, and now all eyes and teeth, seemed a fitter spectacle for Pandemonium, than the light of the bounteous sun. Thus these savages slowly retired along the river-bank, all the while dancing in a circle, like the witches in Macbeth, and leaving us in the expectation of their return, and perhaps an attack in the morning. Any further attempt to appease them was out of the question; whether they were by nature implacable, or whether their inveterate hostility proceeded from some cause of disquiet or apprehension unimaginable to us, it was too probable they might ere long force upon us the painful necessity for making them acquainted with the superiority of our arms. The manner and disposition of these people were so unlike those of the natives in general, that I hoped they might be an exception to the general character of those we were to meet with: an evil-disposed tribe perhaps, and at war with all around them. The difference in disposition between tribes not very remote from each other was often very striking. We had left, at only three days' journey behind us, a tribe of as kind and civil natives as any I had met with; and I was rather at a loss now to understand how they could exist so near fiends like these. I believe the peculiar character of different tribes is not to be easily changed by circumstances. I could certainly mention more instances of well-disposed tribes on the Darling, where indeed, until now, all had met us half way with the branch of peace. We had not yet accomplished one half of our journey to the Murray, from the junction of the Bogan and Darling, and it was no very pleasant prospect still before us, to have to travel such a distance where all the inhabitants might be like these.

THE RIVER MURRAY.

Proceeding next directly towards some high trees at the western extremity of the plains, we reached a favourable bend of the Murray, and there encamped.

This magnificent stream was 165 yards broad, its waters were whitish, as if tinged with some flood, the height of the red bank not subject to inundation, was 25 feet, and by comparing these measurements with the Murrumbidgee, which at Weyeba was 50 yards wide, with banks 11 feet high, (and that seemed a fine river,) some idea may be formed of the Murray. At the place where we encamped the river had no bergs, for its bank conissted of the common red earth, covered with the acacia bushes and scrub of the interior plains. The land at the point opposite was lower, with sand, and a slight rapid was occasioned in the stream by a dike of ironstone.

AUSTRALIAN RIVERS.

One remarkable difference between the Murray and the Murrumbidgee was, that in the latter, even where reeds most prevailed, a certain space near the bank remained tolerably clear: whereas on this river, on the contrary, the reeds grew most thickly and closely on its immediate banks, thus presenting a much less imposing appearance than the Murrumbidgee, with its firmer banks, crowned with lofty forests of "yarra." Each Australian river seems to have some peculiar character, sustained with remarkable uniformity throughout the whole course.

APPROACH TO AUSTRALIA FELIX.

June 29.—The party moved forward in the direction of Mount Hope, and leaving the hill on the left, continued towards Pyramid Hill, where we encamped at about three-quarters of a mile from its base. We were under no restraint now in selecting a camp from any scarcity of water or grass, for every hollow in the plains contained some water, and grass grew everywhere. The strips of wood which diversified the country, as seen from the hills, generally enclosed a hollow, with polygonum bushes, but without any marks of ever having had any water in them, although it may be presumed that in very wet seasons, it must lodge there, as in so many canals, and this, indeed, seemed to me to be a country where canals would answer well, not so much perhaps for inland navigation, as for the better distribution of water over a fertile country, enclosed as this is by copious rivers.

RICHNESS OF THE SOIL.

July 9.—In continuing the same line of route, we crossed several minor rivulets, all flowing through open grassy vales, bounded by finely-undulating hills. At about three miles we came to a deep chain of ponds, the banks being steep and covered with grass: keeping a tributary to that channel on our left, we passed some low hills of quartz; and a little beyond them, at length crossed some poor hills of the same rock, the wood being an open box-forest. After travelling through a little bit of scrub, we descended on one of the most beautiful spots I ever saw:—the turf, and the woods, and the banks of the little stream which murmured through the vale, had so much the appearance of a well-kept park, that I felt loth to break it by the passage of our cart-wheels. Proceeding for a mile and a half along this rivulet through a valley wholly of the same description, we at length encamped on a flat of a rich earth (nearly quite black), and where the *anthistiria* grew in greater luxuriance than I had ever before witnessed in Australian grass. The earth seemed to surpass in richness any that I had seen in New South Wales, and I was even tempted to bring away a specimen of it.

SENSATIONS ON DISCOVERY.

July 13.—We had at length discovered a country ready for the immediate reception of civilized man, and fit to become eventually one of the great nations of the earth Unincumbered with too much wood, yet possessing enough for all purposes; with an exuberant soil under a temperate climate; bounded by the sea-coast and mighty rivers, and watered abundantly by streams from lofty mountains: this highly-interesting region lay before me with all its features new and untouched as they fell from the hand of the Creator! Of this Eden it seemed that I was the only Adam; and it was indeed a sort of paradise to me, permitted thus to be the first to explore its mountains and streams—to behold its scenery—to investigate its geological character—and, finally, by my survey, to develop those natural advantages all still unknown to the civilized world, but yet certain to become, at no distant date, of vast importance to a new people. The lofty mountain-range which I had seen on the 11th was now before us, but still distant between thirty and forty miles; and as the cattle required rest, I determined on an excursion to its lofty eastern summit.

SUNRISE ON THE GRAMPIANS.

July 15.—At six o'clock the sky became clear, the clouds had for once indeed left the mountain, and as soon as it was day, I mounted the frozen rock. But in the twilight all lower objects were blended in one gray shade, like the dead-colouring of a picture. I could only distinguish a pool of water, apparently near the foot of a mountain. This water I afterwards found to be a lake eight miles distant, and which I named Lake Lonsdale. I hastily levelled my theodolite, but the scene, although sublime enough for the theme of a poet, was not at all suited to the more commonplace objects of a surveyor, for the lower world was as obscure and undefined as our ideas of the world to come. The sun was rising amid red and stormy clouds, and vast masses of a white vapour concealed from view both sea and land, save where a few isolated hills were dimly visible. Towards the interior, the horizon was clear for a while; and during a short interval, I took what angles I could obtain. To the westward, the view of the mountain-ranges was truly grand. Southward, or towards the sea, I could, at intervals, perceive plains clear of timber, and that the country was level, a circumstance of great importance to us; for I was apprehensive that between these mountains and the coast, the country might have been broken by mountain-gullies, as it is in the settled colony, and all along the eastern coast, in which case the carts could not

have been taken there, and I must have altered the plan of my intended route. Before I could observe the angles so desirable, clouds again enveloped the mountain, and I was compelled finally to quit its summit, without completing the work. The wind blew keenly, the thermometer stood as low as 27°, and in the morning the rocks were incrusted with ice.

The River Glenelg.

July 31.—We now moved merrily over hill and dale, but were soon, however, brought to a full stop by a fine river, flowing, at the point where we met it, nearly south-west. The banks of this stream were thickly overhung with bushes of the mimosa, which were festooned in a very picturesque manner with the wild vine. The river was everywhere deep and full, and as no ford could be found, we prepared to cross it with the boats.

The river was here, on an average, 120 feet wide, and 12 feet deep. Granite protruded in some places, but in general, the bold features of the valley through which this stream flowed, were beautifully smooth and swelling; they were not much wooded, but on the contrary, almost clear of timber, and accessible everywhere. The features were bold and round, but only so much inclined, that it was possible to ride in any direction without obstruction; a quality of which those who have been shut up among the rocky gullies of New South Wales must know well the value. I named this river the Glenelg, after the Right Honourable the Secretary of State for the Colonies.

Embouchure of the Glenelg.

At length another change took place in the general course of the river, which from west turned to east-south-east. The height of the banks appeared to diminish rapidly, and a very numerous flock of the small sea-swallow, or tern, indicated our vicinity to the sea. The slow-flying pelican also, with its huge bill, pursued, regardless of strangers, its straight-forward course over the waters. A small bushy island next appeared, having on it some rocks resembling what we should have thought a great treasure then, a pile of flour-bags, and we named it accordingly the Isle of Bags. Soon after passing the island, a few low sandy-looking hills appeared before us, and we found ourselves between two basins wherein the water was very shallow, although we had sounded just before in four fathoms. As a wide basin which then appeared directly before us had no outlet, we proceeded into another on the right, and on rounding a low rocky point, we saw the green rolling breakers of the sea through an opening straight before us, which proved to be the mouth of the river. It consisted of two low rocky points, and as soon as we had pulled outside of them, we landed on the eastern one. In the two basins we had seen, there was scarcely sufficient water to float the boats, and thus our hopes of finding a port at the mouth of this fine river were at once at an end. The sea broke on a sandy beach outside, and on ascending one of the sand-hills near it, I perceived Cape Northumberland.

There was no reef of rocks upon the bar; a circumstance to be regretted in this case, for it was obvious that the entrance to this fine river and the two basins was merely choked up with the sand thrown up by the sea. The river was four fathoms deep, the water being nearly fresh enough for use within sight of the sea-shore. Unfortunately, perhaps, for navigation, there is but little tide on that coast: the greatest rise in the lower part of the river, (judging by the floating weeds,) did not exceed a foot.

TO THE WEATHERCOCK.

The dawn has broke, the morn is up,
Another day begun,
And there thy poised and gilded spear
Is flashing in the sun,
Upon that steep and lofty tower
Where thou thy watch hast kept,
A true and faithful sentinel,
While all around thee slept.

For years, upon thee there has poured,
The summer's noon-day heat,
And through the long, dark, starless night,
The winter storms have beat;
But yet thy duty has been done,
By day and night the same;
Still thou hast watched and met the storm,
Whichever way it came.

No chilling blast in wrath has swept
Along the distant heaven,
But thou hast watch upon it kept,
And instant warning given;
And when midsummer's sultry beams
Oppress all living things,
Thou dost foretell each breeze that comes
With health upon its wings.

How oft I 've seen, at early dawn,
Or twilight's quiet hour,
The swallows, in their joyous glee,
Come darting round thy tower,
As if, with thee, to hail the sun,
And catch his earliest light,
And offer ye the morn's salute,
Or bid ye both—good night.

And when around thee, or above,
No breath of air has stirred,
Thou seem'dst to watch the circling flight
Of each free, happy bird;
Till, after twittering round thy head,
In many a mazy track,
The whole delighted company
Have settled on thy back.

Then, if perchance amid their mirth,
A gentle breeze has sprung,
And prompt to mark its first approach,
Thy eager form has swung,
I 've thought I almost heard thee say,
As far aloft they flew,
'Now all away!—here ends our play,
For I have work to do!'

Men slander thee, my honest friend,
And call thee, in their pride,
An emblem of their fickleness,
Thou ever-faithful guide!
Each weak, unstable human mind
A 'weathercock' they call;
And thus, unthinkingly, mankind
Abuse thee, one and all.

They have no right to make thy name
A by-word for their deeds:
They change their friends, their principles,
Their fashions, and their creeds;
While thou hast ne'er, like them, been known
Thus causelessly to range,
But when thou *changest sides*, canst give
Good reason for the change.

Thou, like some lofty soul, whose course
The thoughtless oft condemn,
Art touched by many airs from heaven
Which never breathe on them;
And moved by many impulses
Which they do never know,
Who, 'round their earth-bound circles, plod
The dusty paths below.

Through one more dark and cheerless night
Thou well hast kept thy trust,
And now in glory o'er thy head
The morning light has burst:
And unto earth's true watcher, thus,
When his dark hours have passed,
Will come 'the day-spring from on high,
To cheer his path, at last.

Bright symbol of *fidelity*,
Still may I think of thee;
And may the lesson thou dost teach,
Be never lost on me:
But still, in sunshine or in storm,
Whatever task is mine,
May I be faithful to my trust,
As thou hast been to thine.—A. G. Greene.

THE WHITE OWL, *(Strix Flammea.)*

THE White or Barn Owl is a well-known bird in Europe and Asia, and is found also in North America. The grave look and retired habits of the owl induced the ancients to employ its image as the symbol of wisdom, and we generally find it accompanying the statue of Minerva. In Tartary, according to Pennant, it is honoured for another reason.

The Monguls and natives almost pay it divine honours, because they attribute to this species the preservation of the founder of their empire, Ginghis Khan. That prince with his small army happened to be surprised, and put to flight by his enemies, and forced to conceal himself in a little coppice. An owl settled on the bush under which he was hid, and induced his pursuers not to search there, as they thought it impossible that any man could be concealed in a place where that bird would perch. From thenceforth they held it to be sacred, and every one wore a plume of the feathers of this species on his head. To this day the Kalmucks continue the custom on all great festivals; and some tribes have an idol in form of an owl, to which they fasten the legs of a real bird.

The owl is a nocturnal bird of prey, and the bushy appearance of its feathers would induce us to believe it had a very large head, but when stripped of these the skull of an owl differs but little from that of the hawk. It has, like that bird, a strong curved beak, to tear its prey; but as the owl contents itself with smaller game, this organ is not so powerful; neither are the claws so strong. The food of these birds consists of bats, mice, rats, weasels, and other small quadrupeds that roam abroad in the evening; and although they will at times destroy young pheasants and partridges, it is supposed that the injury inflicted by the owl is not equal to the good performed by its destruction of vermin; for the weasels in particular commit great havoc among the eggs of game. The quickness of the organ of sight in the owl is astonishing; it will detect a small mouse, in the dusk of the evening, at a great distance, and fly down on it with unerring certainty.

The eye itself is set in a cartilaginous case, som thing like the frame of a watch-maker's eye-glass. (see fig. 1.) This it is that gives that staring appearance to the eye of the owl. The opening of the *iris* is also very large, admitting as much light as possible into the interior. By these means it is able to distinguish objects in a very subdued light. The organ hearing is also extremely large, and well arranged f the purpose of catching the dullest sound. At t same time the owl itself is able to hear with so mu acuteness, its own flight is effected with less noi than that of any other bird. Sitting on the rafters in old barn, as soon as some devoted mouse is discover on the floor, the owl gently and noiselessly sprea its downy wings, and glides, not flies, upon its pre the only sound that is heard, with the exception the cry of its victim, is a dull knock, which is cause by the feet of the bird as they reach the ground

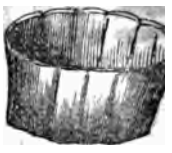
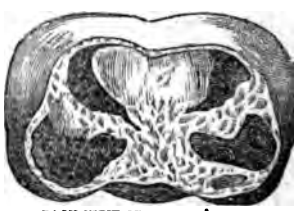


Fig. 1.

The outward part of the ear in most animals termed the *concha*, or trumpet, and it is curious observe how the direction of the opening of th trumpet is varied, so as to receive sounds from t quarter from which the interests of the creature r quire information. Thus we find in all hunting an mals, such as the dog and the cat tribes, the openin of the concha is directed forwards; while in tho whose safety consists in flight, the same opening directed backwards, as, for instance, in the hare, t rabbit, and all the ruminantia, such as the sheep, t deer tribe, and others.

To assist their power of hearing, all the timid rac of animals are furnished with large outward ears, ov the direction of the opening of which they have gre control, through the instrumentality of powerf muscles. The eye also is so placed, as to have a te dency towards the same end, namely, the safety the animal. We find this organ very backward the skull of the sheep and the deer; and they see almost capable of seeing behind them; while in t cat tribe it is placed more in advance.

So in the owl we find, in addition to the usual co trivances to enable an animal to hear well, a larg circuitous chamber round the internal apparatus each of the organs of hearing. In the engraving pa of the bone is removed, to show these chambers. This construction of the bone also answers a double purpose. It renders is much lighter and less cumbersome to the bird.



BACK VIEW OF AN OWL'S SKULL, With part of the bone removed.

IN our judgment of men we are to beware of giving a great importance to occasional acts. By acts of occasion virtue, weak men endeavour to redeem themselves in the own estimation, vain men to exalt themselves in that mankind. It may be observed that there are no men mo worthless and selfish in the general tenour of their live than some who from time to time perform feats of gen rosity. Sentimental selfishness will commonly vary i indulgences in this way, and vain-glorious selfishness w breathe out into acts of munificence. But self-gover ment and self-denial are not to be relied upon for any re strength, except in so far as they are found to be exercis in detail.—*The Statesman.*

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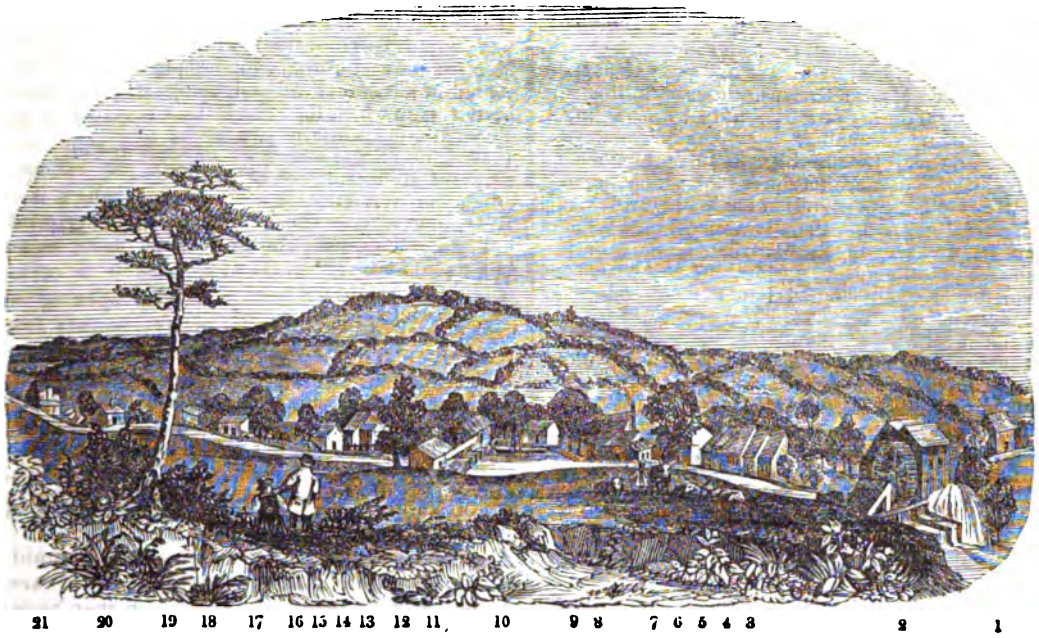
SOME ACCOUNT OF GUNPOWDER.



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VIEW OF THE GUNPOWDER MILLS AT WALTHAM ABBEY, AS THEY APPEARED IN 1735

1 A Horse mill.
2 The Corning and Glazing Engine.
3, 4, 5, Three Horse-mills.
6 The Stables.
7 Coal-mill and Composition-house.
8 The Carpenter's and Millwright's Workhouse.
9 The Clerk's Counting-house and the Watch-house.
10 The Loading-house.
11, 12, Two Stamping-mills.
13, 14, Two Dumb-mills.
15 The Charging-house.
16 The Old Composition-house.
17 The Store-house.
18 The Dusting-house.
19 The Little Stove.
20 Three Sun-stoves, or Drying lends.
21 The Great Stove.

SECTION I.

IF the importance attached by the reader to a subject depends upon its extensive use and demand among mankind, *Gunpowder* must be a subject of more than common interest. This extraordinary substance—a powerful weapon in the hands of the conqueror of nations—has for ages decided the fate of mighty kingdoms. As a means of defence, as well as of offence, to armies, it hurls the murdering bullet with force and precision alike tremendous. Nor are its uses confined to war and carnage. It aids the advance of civilization, by becoming in the hands of the miner and engineer a ready means of overcoming the obstacles which are presented to them in their search after mineral treasures, and in procuring materials for building. Immense blocks of stone, for architectural structures, are easily liberated from their quarries by its means; and it removes, by the sudden mechanical force of its explosion, obstacles which impede the progress of the engineer; and so, to a great extent, accelerates the progress of human exertion and industry. The sportsman, too, owes much of his pleasure to this agent, and the multitude manifests its joy on festive occasions by witnessing fireworks prepared by its means. The birth of princes and rulers it announces to the world: it salutes with its thundering voice the approach of those, who are, in common parlance, called *great*. In short, its uses, whether in war, in the arts, in sport, in exhibitions, or in the thunder of its compliments, are so extensive, and so varied, that we cannot wonder at the expression of any desire to add to the knowledge of its uses that of its History and Manufacture.

The invention of gunpowder has been marked as one of those grand epochs in the history of human invention, surpassed only by that of printing and of the steam-engine. It does not belong to our present purpose to trace the effect of this invention in the history of mankind, but we may allude to a common remark, that gunpowder has tended to make war less sanguinary, and to diminish the mere *animal* courage (which perhaps is only a refined term for ferocity and brute force) and the conflict of revengeful passions, so certain to be excited when men meet in close conflict. It has reduced war, in fact, to a science of *tactics*, in the exercise of which skilful management and contrivance are of more avail than personal, individual valour.

There is some doubt as to whether the ancients were acquainted with gunpowder. Virgil, and many of his commentators, and other authors, speak in such a manner of Salmoneus's endeavours to imitate thunder, as to make us think that he used a composition more or less resembling gunpowder. This prince was so expert in mechanics, that his machines imitated the noise of thunder; and the writers of fable state that Jupiter, incensed at the audacity of this prince, slew him with lightning. It has been more naturally, but we know not how correctly, assumed that he fell a victim to some of his own experiments. Dion and Johannes Antiochenus report of the Emperor Caligula that he imitated thunder and lightning by means of machines which at the same time threw out large stones. Themistius states that the Brachmans encountered one another with thunder and lightning, which they had the art of launching from on high at a considerable distance. Agathius reports of Anthemius Traliensis, that, having quarrelled with his neighbour Zeno, the rhetorician, he set fire to the house of the latter with thunder and lightning. Philostratus, speaking of the Indian sages, says that when they were attacked by their enemies, they did not quit the walls to fight them, but repelled and put them to flight with thunder and lightning. He also alleges that Bacchus and Hercules, attempting to assail them in a fort where they were intrenched, were so roughly received by reiterated strokes of thunder and lightning launched upon them from on high by the besieged, that they were obliged to retire. Mythology and history are so blended in the writings of

the ancients, that we know not where to distinguish the poetical from the true. Thus a similar defeat to that which has just been mentioned as having befallen Bacchus and Hercules, was said by the same writer, Philostratus, to have occurred, or was *likely* to occur, to Alexander, who was unwilling to attack the Oxydracæ, (a people inhabiting the country between the Hyphasis and the Ganges) because they were under the protection of the Gods, and hurled thunder and lightning at their enemies. In Julius Africanus there is a receipt for a composition (very much resembling gunpowder) to be thrown upon an enemy.

There are many similar allusions to thunder and lightning scattered throughout the early writers, and there can scarcely be a doubt that some composition, more or less resembling gunpowder, was known in the early ages. That the ancients were really acquainted with some such composition is said to be proved by a clear and positive passage in an author named Marcus Græcus, whose work, in manuscript, is in the royal library of Paris, entitled *Liber Ignium*, (the Book of Fires). The author, describing several ways of encountering an enemy by launching fire upon him, among others gives the following receipt:—"Mix together one pound of live sulphur, two pounds of charcoal of willow, and six of saltpetre; and reduce them to a very fine powder in a marble mortar." He directs a certain quantity of this mixture to be put into a long, narrow, and well-compacted tube or cover, and so discharged into the air. Here we have the description of a rocket. The case or envelope of the instrument with which thunder is imitated he represents as being short and thick, and but half filled with the composition, which is then secured by binding the whole tightly round with packthread: this is exactly the form of the modern cracker. He then treats of different ways of preparing the match, and how one squib may set fire to another in the air, by having the second enclosed within the first. In short, he speaks clearly of the composition and effects of a powder very much resembling the gunpowder of modern times. This author is also spoken of by Mesue, an Arabian physician, who flourished in the beginning of the ninth century.

Nitre, one of the ingredients of gunpowder, was certainly known in remote antiquity. It was discovered in the east, and was known in China and India long before the commencement of the Christian era. Its property as a supporter of combustion must have been noticed by any one who threw a piece of it upon an ignited coal. "Accordingly," as Dr. Thomson remarks, "we find that its use in fire-works was known very early in China and India; though its prodigious expansive power, by which it propels bullets with so great and destructive velocity, is a European invention, posterior to the time of Roger Bacon."

It certainly appears that, whatever knowledge of gunpowder was possessed by the ancients, it was not in general use, and that the introduction of fire-arms is modern. Friar Bacon, who died in 1278, (about three centuries after the time of Marcus Græcus) was in possession of the receipt for making gunpowder; and in his treatise "*De Secretis Operibus Artis et Naturæ, &c.*" he conceals one ingredient of its composition under the veil of an anagram. He writes, "Sed tamen salis petræ, LURU MONE CAP UBRE, et sulphuris: et sic facies tonitrum et coruscationem, si scias artificium." (But nevertheless take of saltpetre, with *powdered charcoal*, and sulphur; and thus you will make thunder and lightning, if you know the mode of preparing it). "Luru mone cap ubre" is altogether unmeaning in that form; but it is the anagram for *carbonum pulvere*, or *powdered charcoal*. This plan of concealing the ingredients of a new composition, or the details of a new process, by the device of an anagram, was very common until about the age of Newton. It appears as if Roger Bacon had been more solicitous to conceal the use of charcoal, than that of the other two ingredients.

Bacon also says, "From saltpetre and other ingredients we are able to form a fire which will burn to any distance;" and again, alluding to its effects, "A small portion of matter, about the size of the thumb, properly disposed, will make a tremendous sound and coruscation, by which cities and armies might be destroyed." Such are the claims of Roger Bacon to this important discovery, which has changed the whole art of war.

Bacon, in another part of his observations, expresses an opinion that it was by the use of something like gunpowder that Gideon defeated the Midianites with only 300 men, (Judges, chap. vii.) Another account states that the Arabians obtained their knowledge of gunpowder from India; and that they employed it in a battle fought near Mecca, so long ago as the year 690. But this is not probable; for the zeal which prompted the followers of Mohammed to propagate his creed by means of the sword, would certainly, had they known the use of gunpowder, have urged them to the employment of a missile so much more powerful than anything previously used. When we consider that the Chinese have been constantly in the habit of constructing rockets, for a period of time beyond all existing records, it seems to imply that whatever might be the case in Europe, the knowledge of some detonating compound has existed for a long series of ages in China. Rockets have likewise been employed as a military weapon by the native Indian armies from a very remote period.

The first mention of the use of gunpowder in Europe, was in a sea-fight between the king of Tunis and the Moorish king of Seville, in the ninth century; when the vessels of the former are said to have had "certain tubes or barrels, with which they threw thunder-bolts of fire." The Venetians made use of gunpowder on the 28th of March, 1380, during a war with the Genoese; and it is recorded that all Italy complained of it, as a manifest contravention of fair warfare. Our Edward the Third employed it at the Battle of Cressy, or Creci, in the year 1346, when he had four pieces of cannon, which contributed not a little to help him to gain the victory. The knowledge of its uses he probably gained from the earls of Salisbury and Derby, who were present at an engagement between the Moors and the Spaniards, at Algesiras, three years before the battle of Cressy.

The Germans claim the honour of the invention of gunpowder for their countryman Berthold Schwartz, a Franciscan friar, who lived at Mayence between 1290 and 1320. He, in some alchemical experiments, had put a mixture of nitre, charcoal, and sulphur, into a mortar, and having accidentally dropped a spark into it, he was astonished to see the pestle fly off into the air. Supposing gunpowder to have been previously known in some parts of the world, it does not follow that Schwartz should have been acquainted with it; it might therefore be perfectly true that, in some of his alchemical researches, he used the ingredients above mentioned, without knowing the value of them as the component parts of an explosive mixture. The instances are by no means few in number in which alchemy—a fallacious and empirical study, considered with regard to its real object—became accidentally the means of eliciting facts and properties, which have since become of immense value to the world.

Our frontispiece represents the gunpowder mills at Waltham Abbey, as they appeared more than a century ago. We have taken the view from a work entitled, "The History of the ancient Town and once famous Abbey of Waltham, in the county of Essex, from the foundation to the present time. London: printed for the author, 1735." The author of this work we find to be "John Farmer, of Waltham Abbey, Gent.," and at page 3 of his work, the following curious observations are made respecting gunpowder.

"Near the town, on one of these rivers, are curious gunpowder mills, which supply the nation with great quantities of gunpowder, being esteemed the largest and compleatest works in *Great Britain* and are now the property of Mr. *John Walton*, a gentleman of known honour and integrity.

"Some suppose this gunpowder to be as ancient as *Archimedes* in *Europe*, (and ancienter in *India*); yet generally men hold the *Friar* of *Mentz*, the first founder thereof, about three hundred and fifty-six years since: in the making of which there requires three essential ingredients.

"1. Brimstone, whose office is to catch fire and flame of a sudden, and convey it to the other two.

"2. Charcoal pulverized, which continueth the fire and quencheth the flame, which otherwise would consume the strength thereof.

"3. Saltpetre, which causeth a windy exhalation, and driveth forth the bullet. This gunpowder is the emblem of politick revenge, for it biteth first and barketh afterwards, the bullet being always at the mark before the report is heard; so that it maketh a noise not by way of warning but of triumph."

We will not enter into the warm discussions which have been carried on—chiefly from a foolish national vanity—respecting the inventor of gunpowder. Students in science have observed, and observing must deplore, the bitter feelings engendered by disputed claims to priority of invention, in the cases of the Differential Calculus, Logarithms, and

many other scientific processes, both in mathematics, and in the sciences more nearly connected with the arts. Such discussions seldom have the desired effect, viz., to convince an opponent. We will therefore pass on to consider the manufacture and general properties of gunpowder.

Gunpowder is a mixture, in various proportions, of nitre, sulphur, and charcoal. Numerous experiments have been made from time to time by scientific men, in order to determine the exact proportion in which these ingredients may be most advantageously mixed; and it is singular that, after many variations, experience has pointed out the proportions adopted several centuries ago, as being the most suitable. So that in this respect, at least, modern science has not assisted in improving the ratio of the ingredients, however much the purity and excellence of the ingredients may have been ensured: it also shows that much care and attention was bestowed upon this important manufacture at an early period.

It is well known that the force of gunpowder is exerted at the very moment only when it is ignited; hence it is clear that this force is due to a sudden expansion produced by the sudden conversion of the solid gunpowder into its constituent gaseous parts, which consist of carbonic acid, carbonic oxide, nitrogen, oxide of nitrogen, sulphuretted hydrogen, and probably aqueous vapour.

As the value of gunpowder depends very much upon the purity of the ingredients which compose it, great care is taken in the preparation of them; and in order to give our readers an opportunity of better appreciating the offices which each one of the three ingredients performs in the compound state of gunpowder, we will devote a short space to each,—nitre, sulphur, and charcoal. In doing this we shall necessarily allude only to those properties or processes, which are more or less connected with the ultimate employment of the ingredients in the manufacture of gunpowder. The varied forms in which they are employed in other manufactures, do not belong to the present subject, and will not therefore be treated of here.

Nitre, or Saltpetre, is the common name applied to a compound of Nitric Acid and Potash, which in chemical language is called *nitrate of potash*. Nitre is abundantly produced in nature, chiefly in the East Indies, Spain, Egypt, the kingdom of Naples, Hungary, and a few other places; but our supply is from the East Indies.

The form in which nitre presents itself, is either as a crystalline product from a rocky formation, or as a vegetable product. It is by reason of the former origin probably, that it has obtained the name of saltpetre—*salpetræ*, (Latin for rock-salt). The most extraordinary source of mineral or rocky nitre is in the kingdom of Naples. There is a deep cavity called the Pulo of Molfetta; in shape something like an inverted cone: the walls of this cavity are of secondary limestone, and a granular crust of nitre or saltpetre lines the whole of the cavity to the thickness of about an inch. When this granular or crystalline crust is scraped off, it is renewed again in a short time by a chemical process going on within the limestone. A similar phenomenon is seen in other parts of the world, but to a much smaller extent: this source of nitre, however, is quite insufficient in a commercial point of view, and can only be regarded as a natural curiosity.

The grand and prolific source of nitre is the vegetable soil. Nearly all vegetable and animal matter contains a small portion of potash in some form or other; and if nitric acid be present, saltpetre is the resulting compound. Now, if we consider that the constituents of nitric acid are the same as those of common atmospheric air, viz. oxygen and nitrogen; and that the wide difference between these two compounds, results from the different proportions in which the two elements are present, and the different energy with which they combine; we shall not find it difficult to conceive that, if by any process the air become decomposed, and its elements made to reunite in another ratio, the acid base which converts potash into nitre may be derived from the atmosphere itself. But not only the atmosphere: many other substances, containing oxygen or nitrogen, or both, may, by decomposition, become the source of the acid base of nitre; and the European mode of procuring nitre (to which we shall presently allude) shows that some such process is going on in the artificial nitre-beds.

The natural nitre-beds of India are plots of ground in which a nitrous efflorescence forms, at certain seasons of the year. This produce is swept off two or three times a week, and again renews itself. The nitrous earth is thus collected and thrown into casks provided with double bottoms, the upper of which is perforated in a number of places. The casks are then filled up with water, and let to remain for about two hours. Valves or cocks, placed in the lower part of the casks, are then opened, and the liquid collected between the two bottoms is drawn off. This process is repeated three or four times; at the end of which the water is found to be saturated with various salts; among which are nitrate of potash (nitre), muriate of potash, and muriate of soda. This liquid (chemically called lixivium *) is then heated, and bullocks' blood introduced, which tends to purify it by bringing up a portion of the extraneous matter to the surface. These impurities are then removed, and the blood made to coagulate, by the addition of a little lime-water, by which means the blood itself can be removed, and the saline liquid is now tolerably free from dirt and other impurities. The blood may also be coagulated by heating the liquid to 150°. It is then boiled several hours, by which boiling the muriates are deposited at the bottom, and can be separated from the rest of the liquid. It is then ladled into a vat where the rest of the extraneous matter subsides; after which it is kept in a close vessel for three or four days, screened from the air and undisturbed. The liquor is then poured away, and the nitre is seen lining the vessel in the form of crystals. It is then fused into cakes, which is the state in which it is sold as rough nitre; and is brought from Bengal in bags, each containing 164 lbs. The highest price paid for this nitre was about 8*l.* 10*s.* per cwt., in 1795; in 1831 it was about 2*l.* per cwt. The quantity imported in 1821, was 244,886 cwt., in 1826, 131,170 cwt., and in 1831, 175,838 cwt. It pays an import duty of 6*d.* per cwt.

The nitre, in the form thus described, although fit for many manufacturing purposes, is not sufficiently pure for gunpowder. One mode of purification is as follows. The nitre is broken into small pieces, and put into a vessel with 20 per cent. of its weight of cold water, where it remains several hours. The water is then let out from a hole in the bottom of the vessel, and carries off such deliquescent salts as may be dissolved in it. Then 10 per cent. more water is poured in, and allowed to stand some time. This is poured away likewise, and a third washing is performed with 5 per cent. of water. After which the nitre is boiled with half its weight of water, and poured into a leaden cooler. As the cooling proceeds, pure crystals of nitre gradually form: these are washed, and again drained to dryness; which is further attained by spreading them out on a large table, and exposing them to a temperature of about 120°: after which they are in a fit state to be placed in the hands of the gunpowder-manufacturer. The number of processes which the nitre is made to undergo, before it is in a fit state to be employed as an ingredient in gunpowder, is sufficiently indicative of the great care bestowed on the preparation of this important article.

We have said that from the East Indies the greatest part of the nitre for British consumption is obtained; and so great is the produce there, that, although the quantity sent to England is so large, more than double that quantity is supposed to find its way to the Chinese market, to be used in the construction of fire-works, in which the Chinese are acknowledged to excel every other nation. This nitrous soil, however, is not confined to the East Indies; for Mr. Bowles has stated that in some of the uncultivated parts of Spain, nitre is so abundant in the soil that, if the land be ploughed to a depth of three or four inches twice or thrice in the spring, and be suffered to lie fallow during the summer, the soil will yield nitre abundantly in the autumn, which may be carted away, and lixiviated in a manner nearly similar to the nitrous earth of India, before described. A similar property, but to a smaller extent, is resident in the soil in some parts of Hungary.

In France and Germany nitre is obtained from artificial nitre-beds, which consist of the refuse of animal and vegetable bodies undergoing putrefaction, mixed with calcareous and other earths. The nitrogen disengaged from the putrescent mass, uniting with the oxygen of the atmosphere, forms the nitric acid, and the potash is probably furnished by the vegetables and the soil. The principal agents necessary for the formation of nitre in this way have been conjectured to be lime, animal and vegetable matter in a state of decomposition, heat, and dry atmospheric air. The mortar from old buildings is generally found to contain a portion either of nitre or of potash, which could be converted into nitre by the presence of nitric acid. Old mortar, therefore, together with decayed vegetables, animal soil, &c., are the

* The Latin for *lye* or *ley*.

principal materials of which the nitre-beds are formed. Nay, to such an extent was the use of such materials carried under the *ancien régime* of France, that an arbitrary law was enacted, to the effect that all such materials might be claimed by the crown, which put the law in force thus: the materials of all old buildings were claimed on the spot; and the soil or earthen floor of every out-house, shed, stable, &c., was dug up once a-year by order of government, that it might be used in the formation of nitre-beds. In some instances the floors of the poorer sort of cottages were dug up for the same purpose. This impost, like many of the French taxes at that time, was farmed out—a sure way to make an oppressive law more oppressive to the subjects of its operation. The annoyance and angry feelings engendered by this practice raised so much discontent that, when Turgot assumed the direction of the finance, he abolished the practice altogether; and the formation of nitre-beds was afterwards conducted without tampering with the property and homes of individuals. Chalk and decayed vegetable and animal matter were mixed together, and saturated with an animal liquid containing a portion of potash, and at the end of two years crude nitre was extracted from the mass, which afterwards underwent many processes, to purify and separate it from the extraneous bodies. But, at the commencement of the revolutionary war, Berthollet, and other eminent chemists, devised modes of preparing it much more expeditiously and perfectly than had been previously known. We shall allude to this in a subsequent part of our subject.

Nitre is rapidly decomposed when mixed with charcoal and subjected to a red heat. Many of the explosions of the alchemists were, no doubt, due to the employment of these two substances, in their endeavours to obtain an acidulated water, called by them *clyssus of nitre*, (a kind of *nitre-wash*,) to which they attributed wonderful medical virtues. These substances they distilled from retorts, luted to capacious receivers, which were generally blown to pieces in the experiments. Mixtures of nitre and charcoal form the bases of a variety of compositions employed for fire-works, the rapidity of the combustion being modified by the relative proportions of the charcoal.

The second ingredient in gunpowder, of which we shall shortly treat, is Sulphur. This is what is called in chemistry an elementary body; that is, no process has ever yet reduced it to a simpler form or state than that which it exhibits as *pure* sulphur. It is inflammable, and fusible at about 220°; brittle, without taste and smell. Its yellow colour is of course known to every one. The pungent stifling smell from ignited sulphur is due to sulphurous acid gas, a compound of sulphur and oxygen.

The native sulphur employed in this country is obtained chiefly from Sicily, where it occurs in beds of a blue clay formation, occupying the central half of the southern coast of Sicily, and extending inwards as far as the district of Etna.

It is also an abundant product in metallic ores, the most available of which is perhaps the copper ore. Large quantities of sulphur are procured from the Paris copper-mine, in the Isle of Anglesea, in North Wales. The copper-ore containing sulphur in a crude state, is placed in a furnace formed of solid masonry, and exposed to an intense heat, which melts the metallic portions of the ore, and drives off the sulphurous portion in the form of vapour, which, passing through a chimney or tube into a brick chamber, subsides, and lines the wall, ceiling, and floor, with an efflorescence, which is removed at intervals of about six weeks. This rough sulphur is of a spongy texture and of a grayish yellow colour, and too impure to be available for the manufacture of gunpowder. To purify this sulphur it is melted in boilers, and all the impurities, which rise to the surface, are skimmed off, after which the sulphur is poured into moulds of a convenient form. The sulphur procured from the copper-ore, however, always contains a small portion of arsenic, which is not the case with the volcanic sulphur, obtained from Sicily, which causes the latter to be preferred in the making of gunpowder.

The quantity imported in 1821 was 113,844 cwt.; in 1826, 251,981 cwt; in 1831, 289,444 cwt. It varies from about 6*s.* to 10*s.* per cwt., and pays a duty of 6*d.* per cwt. in the rough state, 6*s.* per cwt. in a refined state, and 9*s.* 9*d.* per cwt. in the state of flour.

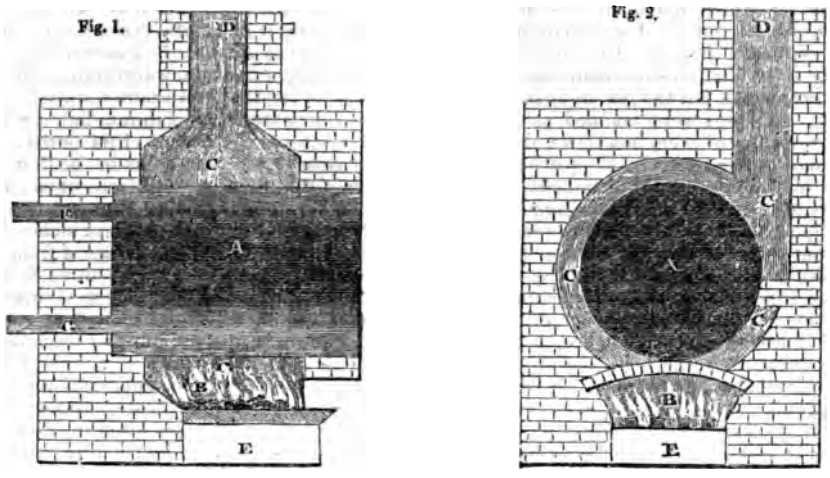
Sulphur is commonly met with in three forms;—1st. massive or crude sulphur; 2nd. roll sulphur; 3rd. sublimed or powdered sulphur, commonly called flowers of sulphur. This latter form is attained by heating solid sulphur sufficiently to raise it to vapour. The vapour, which leaves behind it all the impurities, is collected in large receivers. In this state it is usually contaminated by the presence of sulphurous acid, which, however, may be removed by washing the sulphur in warm water, whereby the resulting sulphur is rendered very pure; since, if a portion of it be gradually heated upon platinum-foil, it will be totally evaporated:—this is a good test of its purity. It is also in its pure state entirely soluble in boiling oil of turpentine. During the wars of Napoleon, when the quantity of gunpowder consumed was immense, great attention was paid to the purifying of the sulphur employed in its manufacture. It was put, in quantities of from ten to twelve cwt. at a time, into iron pots, about three feet in diameter, and two feet deep. The pots were so strongly made, that 1000 tons of sulphur could be melted in each pot, before the united effects of the sulphur and the intense heat rendered them useless. The pots were covered with a sloping roof of masonry, and all the apparatus was calculated to resist the explosive force of heated bodies. The sulphur was boiled in these pots, and all impurities driven off through a tube or chimney communicating with the external air, while only four parts in every hundred of the sulphur were consumed in the process.

The various employments of sulphur in other manufactures—such as sulphuric acid works, &c., do not fall within the scope of our present subject; we will therefore pass on to the last ingredient in the composition of gunpowder.

Charcoal or carbon is, like sulphur, a simple substance. Its purest form is that of the diamond: this is crystallized carbon; and, like ordinary charcoal, is resolvable into carbonic acid, by being burnt in oxygen gas. It also converts iron into steel.

Charcoal is abundantly obtained by the destructive distillation of various animal and vegetable products. A common mode of preparing it in a small way, is to bury pieces of wood in sand, contained within a crucible; to bring the whole to a red or even white heat, which is maintained for an hour or two. Charcoal, thus prepared, is a black, porous, brittle substance. When, however, it is prepared for fuel, billets of young wood are prepared, and formed into a conical pile, which, being covered with earth or clay, is suffered to burn with a limited access of atmospheric air; whereby its reduction to ashes is prevented. The quantity of air admitted is regulated by the management of two holes, one at the top and the other at the bottom of the conical heap. The billets of wood, in pieces of about three feet in length, are arranged in the charring pit, and the heap formed; but, in so doing, two holes are left, one at the bottom, to act as a fire-place, and the other to furnish a draught to kindle the fire. When this is done the upper hole or chimney is closed; and when the wood is thoroughly ignited, the fire-place is stopped up likewise; and so it remains until the wood is completely charred, or converted into charcoal.

Charcoal, thus prepared, is fitted for use in many manufacturing processes; but the purpose which it serves as an ingredient in gunpowder, renders it necessary that it should be purified from many extraneous bodies which unavoidably form part of its substance in the common mode of preparing it. To obviate these objections, and to obtain the charcoal in as pure a state as possible, the wood undergoes a process of distillation; that is, it is subjected to a heat which either liquefies or vaporizes all the foreign matters resident in it, and thus leaves the charcoal or carbon, which no process, either mechanical or chemical, has ever been able to liquefy. The mode of distillation thus employed, is carried on in a large cast-iron cylinder; and to assist the reader's comprehension of the details we will illustrate them by two figures; one of which, (fig. 1), is a section passing along the axis of the cylinder, and the other (fig. 2), a section at right angles to this axis. A is the cast-iron cylinder, about three or three and a half feet in diameter, and five or six feet in length; under which is the fire B, the smoke and heated air from which, C, ascend and surround the cylinder in nearly every part, (as is better seen in fig 2,) and ultimately escape through the chimney D. It will be seen that the cylinder has as few points of support as possible; in order that the flame and heated air may have extensive contact with the cylinder. E is the ash-pit beneath the fire-place; and F and G two pipes or tubes passing through the walls of the building into casks or other vessels placed outside. The whole of these arrangements are set in firm brick-work; and an iron door is fitted to the opening of the cylinder A. Such an arrangement is well calculated for the production of a great heat, and we will now show how that heat is made available for the production of charcoal. The species



CHARCOAL FURNACES.

of young wood selected for the purpose is cut into pieces about nine inches in length, carefully stripped of the bark, and placed in the cylinder, the door of which is then perfectly closed. The heat is then made so intense as to liquefy or else to vaporize all the substances combined with the carbon in the wood; the liquid products escaping through the lower orifice G, and the vaporized substances through the upper orifice F.

Two advantages result from this mode of manufacture. 1st. the charcoal itself is much more pure and valuable, as a component part of gunpowder; and 2nd. the liquid and gaseous products may be preserved in the exterior vessels, and applied to other manufacturing processes. The liquid is *pyroligneous* (*i. e. fire-wood*) acid; which, after being purified from portions of oil and tar, which always distil over with it, becomes acetic acid, the main ingredient in common vinegar; the others being water and colouring matter. Were not the wood in the cylinder carefully excluded from the atmosphere, it would be consumed to ashes by the presence of oxygen; but deprived, as it is, of any constant supply of a supporter of combustion, only a small part of the carbon is lost; the process being really one of *distillation*, rather than of *combustion*.

In some instances the cylinder is double, one sliding within the other; so that when the charcoal in the inner cylinder is completed, the cylinder itself is drawn out, instead of the charcoal only being removed, and another cylinder, supplied with its proper cargo of new wood, is inserted into the already heated external cylinder; by which means much time and fuel are saved.

The selection of the kind of wood, best calculated for the production of charcoal for the gunpowder manufacturer, is a subject which has received much attention. Some woods, such as oak, elm, fir, &c., contain much deliquescent carbonate of potash, which interferes with the purity of the charcoal produced from those woods. Experiments have been made to determine the proportions in which charcoal, produced from various woods, is available as an ingredient in gunpowder; and the following numbers express the comparative merits of five or six species:—Rhamnus frangula, or Black Dogwood=80; Willow=76; Alder=74; Filbert=72; Chestnut and Hazel=66. All other woods have given results inferior to these. So important is the goodness of the charcoal to the ultimate strength of the gunpowder, that with dogwood charcoal, made in a cylinder, the charge for a gun may be one-third smaller than if the gunpowder be made with charcoal obtained by the old method. During the present century plantations of dogwood and alder have been kept up in Kent, Surrey, and Sussex, for the sake of ensuring a good supply of the materials for charcoal for the government powder-manufacture.

The desirable qualities of charcoal, which this manufacture requires, are dryness, lightness, easy pulverization, such as will leave no sensible residue on burning.

Having thus shortly detailed so much of the properties of nitre, sulphur and charcoal, as are concerned in fitting them for being employed in the manufacture of gunpowder, we will proceed to detail the processes of manufacture; previously to which, however, we will treat of the proportions, which have been recommended by different persons, and in different countries, for the composition of the ingredients.

Section II.

There are few compound substances in which the proportion of the component ingredients has varied so much as in gunpowder. The difference of the modes in which the experiments made to determine the most advantageous proportion, have been made—the different qualities of the ingredients employed—and the different purposes to which the gunpowder is to be applied—have probably all contributed to create this diversity. The following shows the proportion in which the ingredients have been chosen in several places.

	Nitre.	*Charcoal.*	*Sulphur.*
England, Royal Mills, at Waltham Abbey	75	15	10
France, proposed by Chaptal	77	14	9
" " Beaumé	80	15	5
" used at present for Ordnance	75	12·5	12·5
" " Sporting	78	12	10
" " Mining	65	15	20
" " Exportation	62	18	20
Prussia	75	12·5	12·5
Austria	76	11·5	19·5
China	75	14·4	9·9

It will be observed that the French employ four different proportions of ingredients for their powder, according as it is required for war, for sporting, for mining, or for exportation. These proportions have been dictated by experience, as the best for those several purposes. It is remarkable that the ordnance proportion is the same as that recommended by Baptista Porta 320 years ago. One of the results of the combustion of gunpowder is sulphurous acid, which has a corrosive action upon the gunlocks; and where it is required to employ guns in long and active service, where few opportunities, probably, occur for dismounting and cleaning, and otherwise repairing these missile engines, and where their perfect action depends upon the clean state of the metal, the source of the corrosive acid, *i. e.* the sulphur, is diminished to a degree not inconsistent with the expansive force of the powder. The increased energy of the explosive force, which depends greatly on the decomposition of the nitre, may be another reason why the proportion of that ingredient is larger in the gunpowder used for artillery, than for the purposes of mining and exportation.

In the second case, as sportsmen generally pride themselves upon the excellence of their arms, and where a certain diminution of the effect due to the sulphur does not militate against the success of the sportsman, a still less portion of sulphur is adopted. In the case of mining powder, where the whole efficacy depends upon the expansive tendency, *i. e.* upon the quantity of gaseous products suddenly liberated, the ingredients are chosen, so as not greatly to interfere with this expansive force; but as immense quantities are employed in mining, attention is paid to the economizing of the ingredients; those for mining-powder being the cheapest proportions of any. There is, besides, another reason for the diminution in the proportion of nitre. It is a well-known law in mechanics, that *time* is an element in all mechanical effects:—that a small force, by acting for a longer time, may produce effects equal to those of a more energetic agent, acting for a shorter space of time. This is shown in the blasting of rocks, where, if the gunpowder

contain a large proportion of nitre, the explosion is very intense, but so instantaneous that the neighbouring portions of rock are shattered before the impulse has had time to communicate itself to the remoter parts: just on the same principle as breaking a window by the blow of a stone or by a pistol bullet: in the former case the glass will be cracked in every direction, but in the latter the bullet will frequently pass through, making a round hole in its passage, but without cracking or shattering the surrounding portions of glass: the bullet has not *time* to produce the same sort of mischief, which the more slowly moving stone would occasion. But (to return to the case of the rock) when the quantity of nitre is diminished, and that of the charcoal increased, the quantity of gaseous matter is greater, but not so intense in the energy of its production. In consequence of this difference of property, a larger portion of rock is shaken and loosened from its hold, without separating or affecting the neighbouring portions so much—which is just the object desired by the miner. Quick-lime or saw-dust may be incorporated with mining powder without much diminishing its effect. The English mining powder frequently contains not more than 60 per cent. of nitre. It has been estimated that the value of 300,000*l.* is expended annually in gunpowder in the mines of Cornwall,—so extensive are the subterranean operations going on in that remarkable and valuable district.

With respect to the fourth kind of powder, that for naval and export purposes, the proportions are further different from another cause, which is probably this. Powder, employed for the navy and for exportation, is necessarily kept for a long time and exposed to much variation of temperature, and to atmospheric moisture. Now gunpowder is never so efficacious as when newly made; and unless kept with much care it absorbs moisture, and the more so in proportion to the quantity of alkali employed: (the alkali is the potash of the nitre,) hence its qualities become greatly deteriorated. For this kind of powder the proportion of alkali is abridged—that being the active agent in promoting deterioration from age, moisture, &c. So far as commercial gunpowder is concerned, there is another and a cogent reason why the proportion of nitre is frequently smaller than in ordnance-powder. Nitre is by far the most expensive ingredient of the three; and is, therefore, the one most liable to adulteration: its place has been in part supplied by other salts; and powder has been sold with so little as 50 per cent. of nitre in it.

In estimating the different purposes to which gunpowder is to be applied, it may be useful to remark that gunpowder containing 19 per cent. of charcoal and 9 per cent. of sulphur has been found to throw a proof-shell to a greater distance than another portion of powder, in which the charcoal was 12, and the sulphur was 12 also.

The French, engaged as they have been in long and active warfare, have from time to time called in the aid of their scientific men, to assist in the preparation of gunpowder. At a time when France was encompassed by foreign armies, which the united powers of Europe had assembled against her,—when a formidable army of French emigrants was assembled at Coblentz, on the Rhine,—when the Austrian and Prussian armies hemmed her in by land,—and the British fleet surrounded her by sea, thus preventing her communication with other nations,—at this time it was suddenly reported to the executive Directory that no more gunpowder was to be had, and that France did not produce the materials for its manufacture! France had for ages been in the habit of importing a large portion of her nitre, her iron, and many other of the implements of war. These supplies being now withheld, it was expected that, thus deprived of all her resources, she would be compelled to submit to any terms imposed upon her by her antagonists. But this was an extraordinary epoch, whether considered with reference to good or evil; and many bursts of mental exertion sprang forth, both in military and scientific proceedings. The French, impatient of foreign aggression, roused to fresh exertion by the imminence of the impending danger, overcame all these obstacles. It was a proud time for French science, which, invoked by its country, fully responded to the call. The names of Berthollet and Monge will be consecrated in the annals of French history, as well as of French science; for it was chiefly due to the zeal, the activity, and the science of those two men that France was not overrun by foreign armies. Berthollet traversed France from one extremity to the other, improved the method of extracting nitre from the soil, (to which we have already alluded), and taught how it was to be practised, and how the nitre could be most expeditiously extracted from the soil and purified. Works were established in every part of France; and gunpowder made in prodigious quantities and in an almost incredibly short space of time. During the second and third years of the republic, every district in France sent two intelligent young men to Paris, making in the whole about 1100, who were instructed by the chemists and scientific men of Paris in the whole process of forming nitre-beds, extracting the nitre, making gunpowder, and founding cannon. These persons were afterwards sent to every part of France, to superintend the establishments set on foot for the management of all these processes.

There was a mode of manufacture, called (from the circumstances under which it originated) the "revolutionary mode;" by which any quantity of gunpowder could be manufactured in about a hundred hours; whereas the time usually employed is two or three weeks. Another plan was also adopted, by which 100 kilogrammes of the "Swiss round powder" could be manufactured in seventeen hours. Berthollet even attempted to form a new species of gunpowder, more powerful than the old, by employing chlorate of potash (a salt which detonates powerfully when mixed with sulphur and rubbed or struck) instead of the nitre. The proportion in which he used it was 80 parts of chlorate of potash, 15 of charcoal, and 5 of sulphur; but after many accidents it was abandoned as dangerous, and too formidable to the friends instead of the enemies of France; for many lives were lost in the experiments performed in using it. It is, however, made at the present day in small quantities, to be used as *priming* for fowling pieces.

We have given these details to the reader from a conviction that twenty-two years of peace, which have been marked by a cheering advance in intellect and intelligence among nearly all classes of society, have contributed to remove those feelings of envy and bitter hatred reciprocally indulged in by two great nations towards each other The popular prejudice—at one time as firmly entertained as if *Francis Moore, Physician*, had made a prediction of it—that "an Englishman can beat three Frenchmen," has long died away; and the time we hope is come, or is rapidly advancing, when exalted actions, high mental results, and excellence of every kind, will be sufficiently appreciated and admired in our contemporaries, without reference to which shore of the British channel be the land of their birth.

We pass on now to consider the details of the manufacture of gunpowder.

The three ingredients being separately prepared, as before detailed, are separately ground to a fine powder, either by a mill, or by means of a pestle and mortar; and are then mixed intimately together, in one or other of the proportions before described. The mixture is then ground. This operation used to be in England (as it is at the present time in France) performed by means of a pestle and mortar; but less hazard of an explosion is experienced by the employment of a powder-mill; which consists of two circular stones of a calcareous or limestone nature; set up edgeways, and rolling, by means of a shaft, on a bed-stone of the same material, which gives no sparks, as sandstone would be apt to do. The formation of this mill is somewhat similar to that of a Bark-mill, or of an Oil-pressing-mill. Each of the stone rollers weighs about three tons, and they have a double motion, similar to that of a wheel moving round a horizontal circle; that is, the rollers move on their own axes, which are horizontal; and at the same time, but more slowly, move round a circle, which circle is the bed-stone. The two rollers do not follow each other in exactly the same track; but one is nearer to the vertical shaft than the other, and therefore passes over a portion of the bed which was left untouched by the other roller. In some instances metallic rollers have been employed; and would perhaps be the best if care were taken in removing the ground paste from them.

The composition, previously mixed, is spread upon the bed-stone, and moistened with as small a quantity of water as will, in conjunction with the weight of the revolving rollers, bring it into the form of *cake* but not of *paste*. The line of contact between the rollers and the bed-stone is constantly preceded by a scraper, which goes round with the roller, continuously scraping upon the bed-stone, and turning the cake into the track of the rollers. From fifty to sixty pounds of the mixture are usually worked at one time on each mill-stone. The time required to get the ingredients thoroughly incorporated varies with the velocity of the rollers from three to seven hours. The mill is worked

either by wind or water, and therefore varies in its velocity according to the moving power.

The mill-cake (as it is now termed) is then scraped off the bed-stone, which is an operation attended with much danger unless carefully performed. The cake is then sent to the *corning house*, to be converted into corns or grains; previously to which, however, it undergoes a heavy pressure by means of Bramah's hydraulic press, or by a screw press, by which process it is formed into a compact body, nearly as hard as a stone. It is then broken into small lumps, from one to two cubic inches each; after which the *graining* or *corning* is executed by placing these lumps on sieves, on each of which is placed a block of *lignum vitæ*, (a hard species of wood,) shaped something like an orange, that is, in the form of an oblate spheroid. The sieves are made of vellum or of parchment-skins, perforated with a multitude of small round holes. Several such sieves are fixed on a frame, which, by proper machinery, has a horizontal motion given to it, by which all the sieves have a rapid revolving motion given to them at the same time. By this revolution the lignum vitæ block in each sieve moves round with considerable velocity, so as to break the lumps of the cake into very small pieces, and force them through the sieves: thus forming grains of different sizes. These granular particles are afterwards separated from the finer dust by proper sieves and reels, frequently made of silk gauze, to prevent metallic friction.

The granulated powder is now hardened, and the rough edges of the grains rounded off by placing the powder in a cylinder or close cask, which is turned rapidly on its axis. This vessel somewhat resembles a barrel-churn, and should be only half filled at each operation. It has frequently square bars inside, parallel to its axis, to aid the polish by attrition. The barrel or cylinder is so arranged that the powder-dust necessarily produced in this operation is shaken out, and leaves the grains in a smooth clean state, which is all that is necessary for actual practice. But, in order to give the gunpowder used in sporting a degree of *polish*, which is considered as imparting an additional beauty to it, the cylinder is lined with woollen cloth, which, rubbing against the grains as they revolve, gives them a gloss; which operation is called *glazing*. Sometimes a little black lead is introduced into the cylinder to assist in this process. It has been before stated that in France the different objects to which gunpowder is to be applied, determine a slight change in the proportions of the ingredients; but in England the same proportions are used for ordnance, muskets, pistols, and sporting, the only difference being in the size of the grains, and in the fanciful polish given to the latter. The ratio of the sizes of the grains used for ordnance, muskets, and pistols is as 195, 180, and 172. The French sometimes give the grains a spherical form by means of a rolling machine; but the composition is not pressed so hard and firm by that process.

The powder, although it may now seem dry, contains a good deal of moisture, which must be removed before the powder is stored away. This process of *drying* is performed in different ways. In France a body of hot and dry air is let into the drying room, where the damp powder is exposed upon shelves. The general mode in this country, until within a recent period, has been to kindle a large fire or furnace exterior to the drying room; and by that means to heat a large cast iron vessel, called a *gloom*, which is protruded through the wall into the drying room. This gloom is brought to a bright red heat, and thus warms the whole apartment. It has, however, been conjectured that some of the awful explosions, which have taken place at powder-mills, have been occasioned by the workmen accidentally spilling a portion of powder near the intensely-heated gloom, or by currents of air blowing some of the grains against the red-hot surface, or by the same thing happening from the sudden closing of the door of the drying room, as was supposed to be the case at the Dartford mills some years ago. The plan now adopted is infinitely preferable, and consists in passing steam-pipes through the drying room: thus effectually preventing any ill effects; for gunpowder requires a temperature of at least 600° for its ignition. If powder be brought to a high temperature, but not within the sphere of ignition, the sulphur will gradually burn off, without explosion, leaving the nitre and charcoal unburnt.

The *storing* of gunpowder for exportation or for keeping is, like every other part of its management, an operation requiring much attention, in reference to the twofold object of avoiding friction and heat, and excluding the admission of moisture. It is kept in barrels, each containing about one cwt. The barrels are lined with copper, the better to exclude moisture; and to show the extreme care necessary, it has been stated that, on one occasion, a barrel being closed up by cast-iron nails, the roughness of the surface admitted some little grains of powder with them, and the friction, in drawing out the nails, caused an explosion.

The importance of keeping powder in a state of perfect dryness, may be illustrated by an occurrence which took place in the last century. In July, 1779, a naval engagement took place between the French and English, in which the French guns did great execution among the English rigging, &c., while the English guns could not reach the French position at all. An inquiry into the causes of this circumstance was instituted by order of the House of Commons: when it was found that the gunpowder employed had become damp by the moisture of the atmosphere: it had become clotted into lumps, in which the particles of nitre were visible to the naked eye.

When powder has become damp by the atmosphere, it can be rendered fit for use by regrinding, drying, &c.; but when the moisture has too far separated the ingredients from each other, it is of no further use as gunpowder; but the nitre, the most valuable ingredient, may be extracted by soaking the powder in hot distilled water, by which the nitre is dissolved, and the sulphur and charcoal can be removed in the solid state. The liquid being purified and crystallized, may be again employed as nitre for the same manufacture.

In the storing of gunpowder for keeping, a dry airy building should be chosen, removed at least a thousand paces from any habitation, provided with lightning-conductors, and surrounded with walls, ditches, and *chevaux de frise*. There should be a guard constantly set to prevent the introduction of fire, and to hinder all persons from entering, who have articles about them likely to produce sparks. These buildings should contain openings for the free passage of air. The casks of powder should stand upon a platform of wood at a distance from the wall, and the powder itself should be sunned and dried every year or two. If the powder be kept in damp places, as for example in the *casemates* (arched under-ground passages) of fortresses, the internal walls should be covered with lead, and a large vessel of unslaked lime be placed in the middle of the apartment, so that the moisture of the atmosphere may be absorbed by the lime. In the transport of gunpowder the casks are often judiciously packed in sacking, and when so packed they are dipped into melted pitch. Barrels thus prepared have been under water for weeks without injury to their contents.

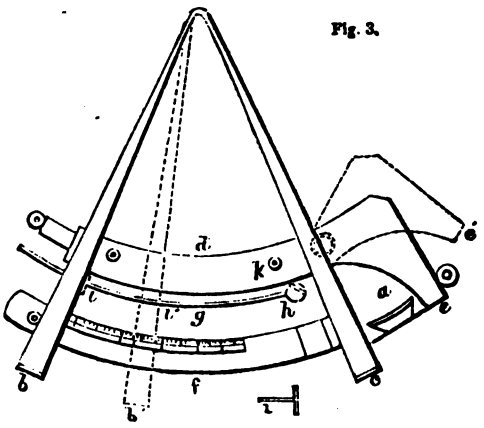
The actual force with which gunpowder begins to en arge its bulk at the moment of explosion has been estimated with extraordinary discrepancy by different individuals, some of whom have derived their estimate from preconceived theories, and others from ill-conducted experiments. The two extreme estimates which we have met with are those of Vernon and of Bracehus; the former of whom estimated the initial impulse at 450 times, and the latter, at 80,000 times, the pressure of the atmosphere. Into such conflicting statements, as to actual intensity of explosion, we will not enter further; but proceed to speak of its real enlargement of bulk, which has been computed to be considerably more than 2000 times its former bulk; that is, the gases into which the explosion reduces the powder, occupy 2000 times the bulk which the solid powder itself occupied.

As the projectile power depends upon this sudden expansion, the excellence of gunpowder is fairly tested by measuring its actual projectile force by means of the *éprouvette*, a French term for any instrument intended to measure or *make trial* of the strength of powder. One form of the éprouvette is a strong barrel, in which a given quantity of powder is fired; and the force of expansion is measured by the action produced on a strong spring or a great weight. The éprouvette now employed in France for testing sporting powder is represented in fig. 3. It is composed of two spring legs *b* and *c*; the leg *c* has at *a* a small reservoir for the powder, together with a pan for the priming. There is also a graduated arc, *f*, which slides in a groove cut in the leg *b*. It has also a metallic wire, *g h i*, which moves through a hole made in the leg *b*: this wire is furnished with a cursor made of skin, which moves by friction. The leg *b* has also an arc *d*, one end of which is bent into a heel *e*, which rests upon the charge of powder.

In order to test the powder, the reservoir, which will hold one gramme, (about 15½ troy grains,) is filled, and the touch pan primed. The sliding cursor is moved to *i*, and the

powder is then fired. At the moment of detonation the reservoir *a*, and the heel *e*, are forcibly separated, each one dragging away the leg to which it is attached, whereby the two legs, *b* and *c*, are brought nearer together; but instantly recoil again by virtue of their spring: the extent of the displacement is, however, indicated by the cursor, *i*, which shows by its new position at *i'*, for instance, that *b* and *e* had been forced into the position *b'* and *e'*: this displacement is measured by degrees engraved on the arc, *f*.

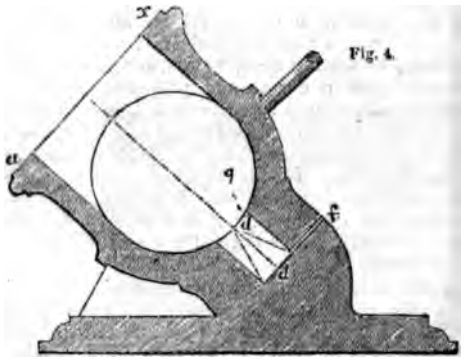
Fig. 3.



Powder for sporting usually marks 12° on this éprouvette, and superfine powder 14°. Each degree represents the effect of one kilogramme of powder, placed so as to bring the two legs nearer together.

The Mortar-éprouvette, or ordnance-mortar of the French, is reserved for assaying the powders used in war. It is composed of a mortar, *a x f*, fig. 4, whose chamber, *d d'*, is

Fig. 4.



sixty-five millimetres deep, and fifty millimetres in diameter. The mouth, *a x*, of the mortar is 191 millimetres in diameter, and the depth 239, from *a x* to *d'*. The bullet, *d*, is 189½ millimetres in diameter, thus leaving a narrow space, called *windage*, between the mortar and the bullet or shell. The vent or touch-hole, *f*, is four millemetres in diameter, and the weight of the copper shell is 293 hectogrammes. The mortar, being inclined at an angle of 45°, is then charged with ninety-two grammes of powder, and fired: when, if the shell be not propelled to a distance of 225 metres, the powder is rejected: good powders carry it as far as 250 or 260 metres.

Another form of éprouvette was devised by the late Dr. Hutton, in which a small cannon was suspended as a pendulum. This cannon was about an inch in diameter at the bore, and was charged with two ounces of powder. The recoil of this little gun, when fired, was measured by a graduated arc attached to the apparatus. Many other forms, one of which is called the *balistic pendulum*, have been devised for the same purpose, with more or less success. Musket-powder is proved by firing at a double target of elm, an inch thick, and previously saturated with water. The depth to which the ball penetrates is a measure of the goodness of the powder.

The details now given will, we hope, furnish the reader with the means of judging of the mode of manufacture, and of the method of testing the purity of gunpowder: we will now say a few words on some of the properties of that singular substance, as determined by experiment.

The theory of the combustion of gunpowder has been much disputed, but without entering into the different theories on this head, we may state as the greatest source of gaseous matter, the decomposition of the nitre, by w the nitrogen is set free in the gaseous state, and the oxy being attracted by the charcoal converts it into carb acid. But this is by no means the only change of s which occurs by the explosion; for a careful analysis of products of the explosion of 100 grains of powder has b stated in the following form:—

100 grains of powder produced five gases and solids, viz.:

Nitrogen	13·24 grains,	or 42	cubic inches.
Carbonic acid	28·77 ..	30	..
Carburetted Hydrogen	2·70 ..	9	..
Nitrous gas	3.25 ..	6	..
Sulphuretted Hydrogen	2·03 ..	4	..
Subcarbonate of Potash	40 ..		
Sulphate of Potash ..	11 ..		
Carbon.....	3 ..		
Sulphur	0·5 ..		

Gunpowder however, reduced to its simple elements w out explosion, has been stated to consist of Oxygen 31 Hydrogen 0·38, Carbon 13·13, Sulphur 10, Nitrogen and Potash 36·75.

Powder may be inflamed by a heavy blow with a h mer; the sudden elevation of temperature caused by percussion is the probable cause. Electricity also ign it; hence the necessity of lightning-rods, attached to bu ings containing any considerable quantity of it. Whe is exposed to the action of heat, the results vary with temperature. If the powder be submitted to the contac a red-hot body, it suddenly explodes. This is what ta place with the gun-lock: the flint, suddenly strik against the steel of the lock, chips off several minute pie of the metal, and the heat generated by the percus fuses the particles, and these fall down red-hot into gunpowder in the pan, which, instantly communicat with the powder in the barrel, causes the whole to expl When a gun "misses fire," as it is called, none of th red-hot particles fall into the pan, but about and aroun

Generally speaking, flame will not ignite gunpowder; red-hot solid body, as a spark, is necessary. Most of readers may have noticed that, when a piece of ligh paper is presented to gunpowder, the explosion takes p some little time after the flame is so held to it; whe the action of a spark is instantaneous. The reason which is that the flame takes a certain time to raise grains of powder to a red heat, under which (as be stated) they will not explode; and it is very difficul bring a flame into contact with a substance placed belo but powder dropped through a flame explodes the mon it comes in contact with it.

Some of the effects of ignited gunpowder are truly w derful: when gunpowder is heaped up in the open air inflamed, there is no report and but little effect produ A small quantity open and ignited in a room, forces the outwards, so as to blow out the windows. But the s quantity confined in a bomb within the same room, ignited, tears in pieces, and sets on fire the whole hc Count Rumford loaded a mortar with one-twentieth o ounce of powder, and placed upon it a twenty-four pc cannon, weighing 8081 pounds; he then closed up e opening as completely as possible, and fired the cha which burst the mortar with a tremendous explosion, lifted up this enormous weight. In another experim Count Rumford confined twenty-eight grains of powde a cylindrical space, which it just filled; and upon b fired, it tore asunder a piece of iron, which would l resisted a strain of 400,000 pounds.

In concluding this paper we may remark that, altho it is too much to expect that all the members of the g human family will regard each other with fraternal feeli and as belonging to one great community, formed to a and be assisted by each other,—yet we cannot but fe the hope that war (and, in consequence, the destruc employment of gunpowder,) will gradually diminish yield to knowledge; or, to employ the idea of a distingui modern writer—that Captain Sword will yield to Cap Pen. The printing-press has done much towards correc our ideas of true greatness and true power; and we forward to the same artillery, more than to big brass g for maintaining the honour and dignity of a nation.

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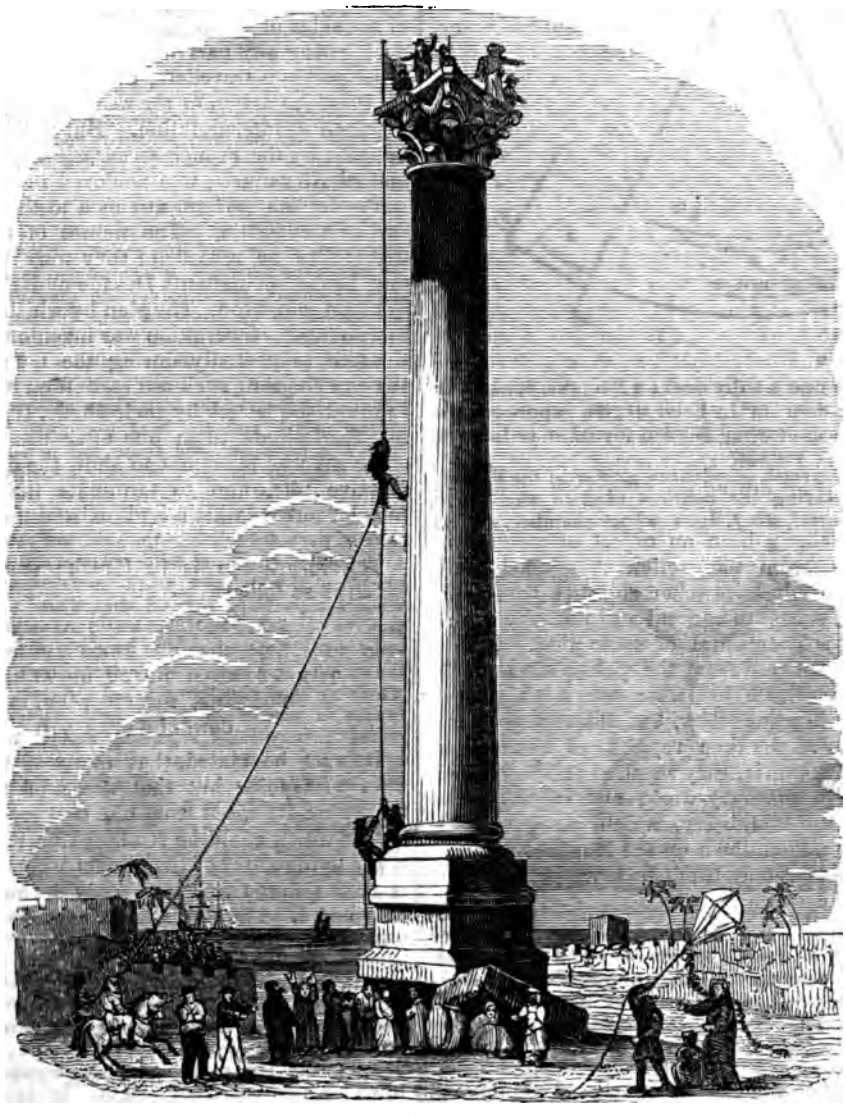
POMPEY'S PILLAR AND CLEOPATRA'S NEEDLE.



POMPEY'S PILLAR.

Among the wonderful monuments which are so largely dispersed over that wonderful land of mystery and sublimity, Egypt, is a colossal pillar which has received the name of Pompey, the great Roman general, and rival of Julius Cæsar; and has in our own time excited the attention of the historian, the antiquary, and the traveller, to such an extent that, after several centuries of error and confusion, our information respecting the real origin of this work of art is clear and decisive.

In the fifteenth century, when learning was beginning to revive, human knowledge was chiefly confined to the architectural and literary remains of the ancients: they were the guides which served to recover mankind from that state of mental weakness and degradation which followed the overthrow of the Roman empire: then it was that the remains of the ancients became sacred, their buildings preserved, and their books sought for and perused with alacrity; the latter often serving as the interpreters of the former, whereby the manners, customs, and intelligence of the ancients became known, and to a certain extent served as a model and a guide to a community whose intellectual strength was infantine.

In this way it was ascertained that a monument had been erected to Pompey in or near Alexandria, the capital of Lower Egypt. It was therefore naturally supposed that the Pillar represented above was the monument in question. In the absence of all knowledge derived from inspection of the pillar itself, the name *Pompey's Pillar* was attached to it; and thus almost undisputed was it handed down century after century, until the occupation of Egypt by the armies of France and England, about forty years ago.

Before this time one or two travellers had converted it into a trophy erected to the memory of Septimius Severus. This pillar was said to be the remnant of an ancient city, which it once adorned: another account says that it was placed upon the ruins of the city of the Ptolemies; but in the time of Septimius Severus this city was not in a ruined state.

Before we proceed to notice the real object of the erection of the pillar, let us say a few words descriptive of the pillar itself, of which our engraving will convey a very accurate idea. It is situated about two miles from the sea-shore, upon a slight eminence, and its vast proportions strike the beholder with amazement. Its height is 88½ feet, and of the Corinthian order of architecture. The shaft of the column consists of one solid block of red granite finely polished, 64 feet high, and 8 feet 4 inches in diameter. This shaft leans a little towards the south-west. The pedestal is 10 feet high, with a base of 5½ feet. The height of the capital is nine feet. The shaft is executed in a pure and masterly style, but the pedestal and capital are of very inferior workmanship, and executed at a different time: they are not of the same granite as the shaft: they are clumsy in style, and in an unfinished state, so as to give an outline only of the effect intended to be produced: the pedestal, too, is deficient in height. The shaft is in a good state of preservation, except on the north-west, which has suffered from the constant winds which blow from that point during the greater part of the year.

This pillar has long been an object of interest to the rude Arabs, from the notion that no human beings could possibly have taken so much trouble to erect such a pile, except to conceal and preserve under it a large and costly treasure of some kind. Hence the pedestal has suffered from the violent attempts of the Arabs to penetrate below it: one Arab sought to blow it up with gunpowder, but did not succeed. When the forces of the then republic of France got possession of Alexandria, they repaired and supported the pedestal with masonry-work, and crowned the capital with a Cap of Liberty, which, however, was soon afterwards pulled down by the English.

When the celebrated English traveller, Clarke, visited Egypt, he made Pompey's pillar an object of particular examination. He was surprised to observe that the pedestal did not rest upon the sand; for on digging this away, so as to get beneath the pedestal, he found, to his surprise, that the whole of this immense pile, consisting of three parts, pedestal, shaft, and capital, was sustained upon a small prop of stone, about four feet square. Around this central base, but in very irregular positions, other masses had been placed, consisting of the sepulchral fragments of ancient Egyptian monuments, which did not appear to contribute to the support of the column, but to have been brought there for the purpose of maintaining the prop in its adjusted situation, until the pedestal could be raised upon it. The four sides of the prop are inscribed with Egyptian hieroglyphic figures, but the position of these shows that the prop has its original base uppermost, for they appear inverted; thus affording complete proof that the stone whereon they are inscribed belonged to other more ancient works, and that they must have been ruins before the column was erected upon its present basis; and consequently that the work is of comparatively modern construction.

A similar conclusion had already been made by Denon, shortly before Clarke's arrival in Alexandria. He concludes that the foundation being made of ruins announces a modern construction: also that the erection of this monument may equally belong to the time of the Greek emperors or to that of the caliphs.

The latter part of Denon's conclusion affords a curious instance of a practice which he himself condemns; viz., that of drawing conclusions from insufficient data. A numerous body of men, renowned for their science and learning, accompanied the French army into Egypt, with the especial object of examining and collecting Egyptian antiquities. Pompey's Pillar was an object of careful and repeated examination; and although an inscription was known to exist on one of the sides of the pedestal, yet they did not succeed in deciphering any part of it. They agreed in the reports of all previous travellers, that it was too much defaced by time, the action of the weather, and wanton injury, to admit of interpretation. But that which could not be done by the French *savans*, during their protracted stay at Alexandria, was achieved in a few weeks by some English officers, attached to the English garrison at Alexandria. The names of these gentlemen deserve to be recorded: they were captains Dundas and Leake, lieutenants Desade and Squire, and Mr. William Hamilton. The plan by which they succeeded in reading the inscription was ingenious. By watching the pillar repeatedly during the few moments when the sun shone in such a direction on the pedestal, as to mark the letters by their shade, they were enabled to discriminate them one after another; and thus sufficient was made out to show the real origin of this massive pile, and to terminate the existence of a popular error which had existed for five hundred years.

The inscription is in Greek; one translation of which is as follows:—

TO DIOCLETIANUS AUGUSTUS,
MOST ADORABLE EMPEROR,
THE TUTELAR DEITY OF ALEXANDRIA,
PONTIUS, PREFECT OF EGYPT,
CONSECRATES THIS.

It must be stated, that many of the letters were utterly illegible: but that some of the words were known or surmised from one or two or more of the letters which could be read. This remark does not apply to the name of the prefect who erected the work, since the first two letters only of his name can be deciphered. Thus Dr. Clarke's version of the inscription is somewhat different. It is as follows:—

POSTHUMUS, PRÆFECT OF EGYPT,
AND THE PEOPLE OF THE METROPOLIS,
[*honour*] TO THE MOST REVERED EMPEROR,
THE PROTECTING DIVINITY OF ALEXANDRIA,
THE DIVINE HADRIAN AUGUSTUS.

Now since we know that Hadrian lived from the year of our Lord 76 to 130, it is quite clear that Pompey has no connexion with this pillar; and that it ought no longer to bear his name.

We have stated above that the French, when they saw the dilapidated state of the monument, immediately set about repairing it. It affords a curious illustration of the difference, as respects the cultivation of taste for works of art and monuments of antiquity, between the French and the English. When the latter got possession of Alexandria, the visitants to this noble pile amused themselves with chipping off large pieces of granite from the pedestal, in order to carry them home as curiosities to their friends in Europe. This abuse so greatly prevailed, that a sentinel was finally placed on the spot, as the only means of preserving the pedestal from utter ruin. In 1830, Mr. Webster, in visiting Alexandria, anxiously proceeded to Pompey's Pillar, to read the far-famed inscription, on the west side of the pedestal. He

found indeed an inscription which required no peculiar obliquity of the solar rays, to enable him to decipher. The inscription read by him was in gigantic letters of black pitch, as follows:—

HENRY CRAM,
NEWCASTLE-UPON-TYNE,
H.M.S. GLASGOW, MARCH, 1827.

While Johnsons, Thompsons, and eternal Smiths, were innumerable: the "writing materials," (which we have neglected to describe in our series on this subject, published in the Saturday Magazine) were black paint, red-ochre, pitch, and sand.

The engraving which illustrates this article represents the means employed by some English sailors to arrive at the summit of this pile. By means of a kite, a strong cord was passed over the top of the column, and securely fastened on one side, while one man climbed up the other. When he had reached the top, he made the rope still more secure, and others ascended, carrying with them water of the Thames, of the Nile, and of one of the Grecian Islands: a due supply of spirits was also provided, and thus a bowl of punch was concocted; and the healths of king George the Third, and other distinguished persons, were drunk. This ascent was made when the British fleet was in Egypt, since which time the ascents have been numerous; for, according to Mr. Webster, the crew of almost every man-of-war which has been stationed in the port of Alexandria has thought the national honour of British tars greatly concerned in ascending the height of fame, or, in other words, the famous height, which Pompey's pillar affords. It is not unusual for a party to take breakfast, write letters, and transact other matters of business on this very summit; and it is on record that a lady once had courage to join one of these high parties.

In the neighbourhood of Alexandria there exist two ancient monuments called *Cleopatra's Needles*. This fanciful name has been given to two obelisks of red granite, one of which is erect, and the other prostrate. According to a survey of the latter, made by Clarke, the base measures seven feet square, and the length is sixty-six feet. They are covered with hieroglyphics cut into the stone to the depth of two inches. The granite was observed to be in a decaying state.

After the English were in possession of Alexandria, a subscription was opened by the military and naval officers for the purpose of removing the prostrate obelisk to England. With the money so raised they purchased one of the vessels sunk by the French in the old port of Alexandria: this was raised, and prepared for the reception of the obelisk. The French had already cleared away the heaps of rubbish which enveloped it, and the English turned it round, and found it in a fine state of preservation. It was moved towards the vessel, when an order arrived from the Admiralty, prohibiting the sailors from being employed at this work.

No further attempts have been made to remove this fine monument to Europe. A few years ago the French removed a fine granite column, of the same character as Cleopatra's Needles, from the interior of Egypt to Paris, and it now serves to adorn that flourishing capital. It is called the Obelisk of Luxor.

The two needles of Cleopatra, as they are so questionably called, served to decorate one of the entrances to the palace of the Ptolemies, the ruins of which are contiguous.

ENGLAND IN THE OLDEN TIME.

I.

UNDER the general title of "England in the Olden Time," we propose to present to our readers, occasionally, accounts of many of the ceremonies, customs, and pastimes of our forefathers, some of which remain in use to the present day, while others have become obsolete, and are only known to us from accounts preserved in ancient manuscripts, or in some of the earliest printed books.

While we are ready to grant that the future advancement of the human race in all that is good and valuable, is and ought to be one of the highest objects of our attention, we ought also to be ready to admit that the usages of by-gone ages afford us valuable tests by which to judge of the state of mind at those times; and by comparing those times with the present, to determine how far we have advanced in mental and moral power, and to what extent we are justified in looking forward to further improvements. If these remarks be just, we have to decide what are the best tests of the manners and customs, or rather the state of mind, among a people. Our historians tell us of the wars of kings and princes, too frequently carried on for their own personal ambition and aggrandizement;—our biographers detail to us the actions and the thoughts of men who have rendered themselves objects of note, either for good or evil:—our geographical and topographical writers tell us what was the nature of any particular part of the country, whether favourable for hunting, for shooting, for antiquarian research, &c. But something more than all this is necessary: the mass of the people, and not distinguished individuals, give the tone to popular customs. Mr. Strutt observes,—

In order to form a just estimation of the character of any particular people, it is absolutely necessary to investigate the sports and pastimes most generally prevalent among them. War, policy, and other contingent circumstances, may effectually place men, at different times, in different points of view; but when we follow them into their retirements, where no disguise is necessary, we are most likely to see them in their true state, and may best judge of their natural disposition.

In fulfilment, therefore, of the plan as above announced, we proceed to notice a curious and once favourite game called

QUINTAIN.

IN the age of chivalry, when Europe swarmed with armed knights, ready to be engaged in almost any encounter, good or bad, it is obvious that there must have been times when business of importance did not require their attention, and when they were at liberty to engage in such recreative exercises as might suit their character and tone of mind. The *tournament*, in its various forms and modifications, was the most prominent of these, and one branch or division of the tournament was that class of exercises called *quintain*, after the name of the inventor.

The principle of this exercise consisted in running or riding swiftly up to a stationary object, and striking it with a lance or some other weapon at the moment of passing it, the blow being given with especial attention to the attainment of some particular object. The original object was, to habituate youthful knights to the steady and accurate use of the lance during a combat, and while on horseback. The quintain, or object at which to strike, was originally nothing more than a trunk of a tree, or a post. Afterwards this was replaced by an imitation of the human head and body, carved in wood, and turning upon a pivot. The figure held a shield in its left arm, and bran-

dished a wooden sabre in the right. In running at this figure it was necessary for the horseman to direct his lance with great adroitness, and strike upon the forehead between the eyes, or upon the nose; for if he struck wide of those parts, especially upon the shield, the quintain turned about with much velocity, and, in case he was not exceedingly careful, would give him a severe blow on the back with the wooden sabre held in the right hand: this was considered highly disgraceful to the performer, while it excited the laughter and ridicule of the spectators. In point of importance, a blow between the eyes was reckoned best,—on the nose, second best,—and under the nose third in excellence.

This exercise was not confined to horsemen, but was also conducted on foot. A *post-quintain*, or a firmly-fixed pillar, was the object of attack. The practitioner assailed this post, armed with sword and shield, aiming his blows as if at the head, the face, the arms, the legs, or the sides, of his supposed antagonist: taking care at the same time to keep himself so completely covered with his shield, as not to give any advantage, supposing he had a real enemy to cope with.

It was one of the laws of chivalry, that no one under the rank of an esquire could engage in the justs and tournaments of which we read so much in early writers. It followed from this, that if the people generally wished to engage in such exercises, they had to establish a particular class of them for themselves. This was the case in England. Many rude varieties of quintains were employed in the thirteenth and two following centuries. The quintain was frequently nothing better than a stake fixed into the ground, with a flat piece of board made fast to the upper part of it, as a substitute for a shield; and such as could not procure horses, contented themselves with running on foot to the quintain. Youthful aspirants to chivalric fame, sometimes manufactured a wooden horse on four wheels: one boy sat on the horse, and two others drew him along towards the quintain, at which he struck with a pole, or any other implement, which he could persuade himself bore a resemblance to a lance. This sport is represented in the accompanying figure.

Dr. Plott, in his *History of Oxfordshire*, describes the quintain of the peasantry, as used in his time.

They first set a post perpendicularly into the ground, and then place a slender piece of timber on the top of it, on a spindle, with a board nailed to it on one end, and a bag of sand hanging at the other. I saw it at Deddington in this county. Against this board they strike with strong staves, which violently bringing about the bag of sand, if they make not good speed away, it strikes them in the neck or shoulders, and sometimes knocks them off their horses:—the great design of this sport being to try the agility both of horse and man, and to break the board. It is now only in request at marriages, and set up in the way for young men to ride at as they carry home the bride; he that breaks the board being counted the best man.

Stow describes the prevalence of the same pastime at a spot which a modern Londoner would be little disposed to expect.

This exercise of running at the quintain, was practised in London, as well in the Summer as in the Winter; but especially at the feast of Christmas, I have seen a quintain set upon Cornhill, by Leadenhall, where the attendants of the lords of merry disports have run and made great pastime; for he that hit not the board end of the quintain was laughed to scorn, and he that hit it full, if he rode not the faster, had a sound blow upon his neck with a bag full of sand hanged on the other end.

Another variety of this sport was the *water-quintain*, usually practised by young Londoners upon the water during the Easter holidays. A pole or mast was fixed in the midst of the Thames, with a shield firmly attached to it. A boat, which was placed at some distance, was driven swiftly towards it by the combined force of tide and of oars; and a young man who stood at the prow struck against the shield with a lance, as the boat passed onward. If he were dexterous enough to break the lance against the shield, and retain his place, the intended object was answered; but if he failed in so doing, he was almost inevitably precipitated into the water, and the boat went on without him; two other boats were, however, at hand, to render him assistance, and pick him up. The bridge, (for there was then no other bridge than London Bridge over the Thames,) wharfs, and houses near the river, were crowded with spectators, to witness these exhibitions.

When Leicester entertained Queen Elizabeth at Kenilworth, among the other entertainments was a representation of a country bridal.

In the castle, (says Laneham,) was set up a comely quintane for feats at armes, where, in a great company of young men and lasses, the bridegroom had the first course at the quintane, and broke his spear "très hardiment" (very boldly, or with much courage). But his mare in his manage did a little stumble, that much adoe had his manhood to sit in his saddle. But after the bridegroom had made his course, ran the rest of the band, awhile in some order, but soon after tag and rag, cut and long tail; where the speciality of the sport was to see how some for his slackness had a good bob with the bag, and some for his haste to topple downright, and come tumbling to the post: some striving so much at the first setting out, that it seemed a question between man and beast, whether the race should be performed on horseback or on foot; and some put forth with spurs, would run his race byas among the thickest of the throng, that down they came together hand over head. Another while he directed his course to the quintane, his judgment would carry him to a mare among the people; another would run and miss the quintane with his staff, and hit the board with his head.

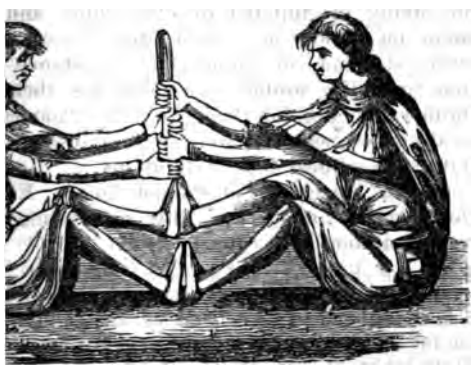
Another quintain, used as a juvenile sport, was a tub full of water balanced on a post or pillar; and the trial of skill consisted in striking this with a lance or pole in such a manner that the water, when the tub was upset, should not drench the spearsman.

Military men in the middle ages sometimes practised at a man completely armed, whose business it was to act upon the defensive, and parry their blows with his shield. An observation made by one knight to another on this subject has been preserved:—

I do not by any means esteem you sufficiently valiant for me to take a lance and just with you; therefore I desire you to retire to some distance from me, and then run at me with all your force, and I will be your quintain.

Sometimes a man, representing a living quintain, was seated upon a stool with three legs without any support behind, and the business of the tilter was to

· him; while, on his part, he was to turn
: of the pole or lance on one side with his
ıich, if adroitly accomplished, seldom failed
tate his antagonist to the ground.
r kind of quintain exercise was practised
ny lance or shield, the feet serving both
)ne man, seated on a stool, held up one leg
ly:—another man stood opposite to him,
his uplifted foot endeavoured to thrust the
his stool, which the latter, of course, en-
to prevent:—the soles of the opposing
ll be understood, came in contact.
her form of the sport, the sitter holds up
s in the last instance; but his opponent is
a swing, and being drawn back by a third
e velocity with which he swings forward is
ıoving power by which to knock the sitter
ol; if this fails, the swinger is very liable
wn backward out of his swing.
t variety which we shall give, and which can
ıe under the name of quintain, is repre-
the annexed cut. Two persons sit upon
l, place the soles of their feet in contact,
hold of a stick common to both of them.
st consists in endeavouring to overturn the
; by main pulling force.



or running at the ring, differed but little
ıtain. A ring, suspended from a kind of
ng so as to be on a level with the eyebrow
ıeman. He rode under it at full speed,
is head as he passed, and aimed at thrusting
nto the ring, and bearing it off as a trophy
cess.
st reserve justs and tournaments for a sepa-
e.

VORACIOUSNESS OF THE EEL.

day standing on a low ledge of rock, enjoying
ul scenery of the Tay, I witnessed a very striking,
as I know, novel exhibition, touching natural
ng nothing less than a chase upon terra firma of
n eel, and illustrative in a remarkable manner
rness with which the latter animal pursues its
attention was first drawn to the spot by a rust-
where I saw the fugitive in the act of emerging
ater. The eel, of large dimensions, soon fol-
ter promptly effecting a landing on the rock on
s standing, which both of them did with great
he crab took to his heels with all manner of des-
soon showed his pursuer the advantage of the
of a supply of limbs. The eel, however, nothing
though labouring under the primeval curse of
t, dashed after him with the utmost eagerness;
oon obvious that the locomotive machinery of
as dismally at fault. He wormed, twisted, and
imself to and fro to comparatively little purpose,
i this way he kept up the chase for a consi-
tance, until at length, on my approach, both of
a short cut, and got again into the water.— ?

FRUITS DESIGNED TO BE A SOURCE OF ENJOYMENT TO MAN.

THE fruits constitute a very peculiar set of productions, united by a common bond; in a certain sense, superfluous to us, and sources of pleasure. Many of them may be viewed as originally designed for food alone; but we need not here consider them in this light, nor point out their salutary, medicinal, or other useful qualities; since the present inquiry is limited to superfluities, or pure sources of pleasure. Yet there are two general facts relating to fruits which must not be passed over; because they must be regarded as special efforts of beneficence, whether the results belong to food, health, or pleasure.

The most remarkable of these is the succession in which they have been destined to appear, and it will be most striking to him who shall consider it as a philosophical botanist. It is opposed to the inferences which science would have made before experience; while, being known, it defies all explanation. Like so much more, we must view it as an arbitrary law, or as the will of God; acting, by whatever means it does act, for the good of His creatures.

Of many fruits at least, the nature is necessarily transitory. They are always connected in some manner with the seeds, which must often be dispersed as soon as they arrive at maturity, that the plant may be perpetuated. Or they are particular portions of the whole fructification, which must, from its very nature, have soon perished: while, in other cases, they could not but partake of the temporary duration of the whole vegetable; or are such that their value and uses depend on a constitution, both organic and chemical, which is of necessity perishable. What then would have happened, had all plants produced their fruits at the same period; as we might have expected, knowing that heat is the cause of their production and their ripening? They could not have been consumed: we should have been overwhelmed with them for one short period; and, through the rest of the year, we should have wanted. And accordingly, where this arrangement is more purely conducive to pleasure, they have been commanded to appear in succession, so that as one vanishes, another is ready to supply its place. We profit by this even in our own short summer: it is more extensively the fact in tropical climates, where these productions are far more numerous, and their uses, both to man and animals, much greater. And if, in our limited summers, these fruits must be equally limited, so is it contrived that the want, the necessity, or the utility, and almost the enjoyment, should keep pace with the means. Under our artificial habits this cannot be rigidly exact; but the general truth is sufficiently familiar.

The other fact alluded to, conduces to the same good ends. All fruits are not transitory or perishable, so as to demand immediate consumption. On the contrary we find in them the greatest variety; from an immediate urgency to be used as soon as they are perfect, to a power of delay which enables us to preserve them through an entire year, till a new summer comes, to recommence the same round. And so admirably have the provisions for this been appointed, that many will not ripen on the parent tree: a fact which, familiar as it is, offers no small difficulty, both in vegetable and ordinary chemistry. Did the organic chemistry not continue to act, the fruit would rot, since this is the invariable result of that agent when life has left those organizations. The stored apple is not less alive than its seeds: its principle of vitality remains, one of those inexplicable detachments, like the slip, from the general life, and it con-

tinues to act on the fluids which the vessels contain, through those vital powers which equally directed the organic chemistry before. Thus does it convert the malic acid into sugar, and thus many other similar conversions are effected; not one of which, extra-organic, or common chemistry, has yet been able to perform.

In this and other modes, have provisions been thus made for preserving fruits and continuing their useful succession; while the most universal of these is a constitution which renders them naturally durable; often, without any effort of our own; and, at other times, under some assistance from art. And this provision, like the former, extends its influence very widely. The constitution of the globe did not allow of an equal climate or summer to all the world, though man is permitted to dwell everywhere. Commerce, equalizing in a great measure this necessarily partial distribution, causes the inconvenience to be little felt. In the latter case, where the constitution of the fruit is naturally durable, as in the date, for example, there is nothing to excite peculiar notice, more than in other instances of analogous commerce. But there is a contrivance in some of the perishable or truly summer fruits of the hot climates, which must not be passed over: enabling them not only to be preserved, but transported far and wide; adding to the wealth of those who produce, and to the enjoyment of those who consume, as they also add to the wealth even of the latter, by stimulating labour. The lemon and the orange ripen, like the apple, at a distant time, without the aid of the parent tree, or the parent climate; without light, and without heat: giving us, in the regions of snow, all that we could have derived from a tropical sun. An object so familiar is, as usual, little considered: but, independently of this power of delay, of the extraordinary conversion of citric acid into sugar, in this little and strange laboratory, and of an investment which, appointed for the defence of the interior, is moreover so contrived that it shall furnish the greatest resistance when that was most needed, he who is still ignorant must be taught to admire the beautiful mechanism, elsewhere pointed out, through which the enclosed fluid is preserved, under a great chemical difficulty. Had the exterior structure included a fluid only, as the cocoa-nut does, and as, to all of its immediately useful purposes, it might have done, this must have fallen into fermentation, as chemistry well knows. Yet that has been guarded against, and in the exact manner in which this science would have suggested. Each compartment is so small, that fermentation cannot take place: while it is not unlikely that this very law, so unexpected under our general knowledge of this process, was appointed for such and similar ends. Nor was this structure necessary, as regards either the vegetable or the produce. The fluid might have been secreted as that of the cocoa-nut is; it would have been equally useful to those who possessed the tree, but its wider uses would have been unattainable.

I may turn to the further provision for preservation and transportation which has been made through drying; most often, but not necessarily, demanding the assistance of art. Thus do the fig, and the date, and the grape, almost preserve themselves; as many others require but little aid from our own industry, while the means are thus pointed out to us by nature. If Arabia would be uninhabited without the camel, so might it but for the date: while the properties of both equally are such as man would have given, had he possessed the power with the inventive faculty. But the fundamental provision for this is laid in that of sugar: a substance deserving peculiar notice, not only as an article of food, or a source of enjoyment more universally allotted to animals, than any other of the productions affecting the sense of taste, but because of its remarkable chemical properties, directed, we can scarcely doubt, essentially to the ends here under review. Incapable of change itself, it preserves not merely the vegetable, but even the animal organizations, from chemical destruction: and thence also, where nature has not added it to the fruits in sufficient quantity, is art enabled to supply it with the same useful results, in modes which are as familiar as they are numerous.

To return now to the consideration of the fruits themselves, it is necessary first to remark, that although appendages to the seeds, in some manner, they are not essential to those, or to the perpetuation of the plant. And being superfluities, we must conclude that they were superadded for an extraneous purpose, indicated with sufficient clearness by the uses or pleasures which they afford to us. Had this superfluity, however, always been of the same nature, or had every fruit constituted the same portion of fructification, we might still have imagined some necessity as to the plant itself, or attributed the whole to some needful vegetable arrangement. The present variety is hostile to such a conclusion, and unites with the fact of the superfluity, in leading to that which I have here drawn. I must therefore give a slight sketch of the botanical nature of fruits, though limiting myself to familiar, and nearly to domestic examples.

In the strawberry, the fruit is the receptacle; a spongy substance with an expanded surface, to which the seeds are attached superficially. Though in a very different class, and with a very different law as to the relation between the grower and the seed, it is a similar part which sustains the seed in the thistle and dandelion. The analogy of these shows that however the receptacle was necessary to the strawberry, it need not have become a fruit. The dry receptacle of the thistle is equally efficacious to the support and protection of the seeds. The pine-apple may be associated with this, if not with botanical accuracy. Here, a whole plant has been occupied in producing a single fruit, almost as large as itself; while it is an entire superfluity, and also a very operose arrangement, compared to the fruit of the strawberry. And as if it had been foreseen that the use of the fruit would destroy the seed, in both, each plant has been enabled to continue itself by voluntary offsets, and the latter, further, by that obstinately vital production, the crown, which the consumer of the fruit would be troubled to destroy, as its offensive nature makes him gladly throw it away.

The Acinus of botanists constitutes the basis of another class of fruits, and the raspberry is a familiar example. In this case there are more seeds than one connected with the superfluous structure which constitutes the fruit; while the smallness of the receptacles for the juice serves the same purposes as the bottles in the orange. And as there are dry acini, just as there are dry receptacles in some plants, of which the American raspberry is a familiar example, the conclusion is the same in both cases. If the instance here selected is an example of a perishable fruit, the acini in the pomegranate are protected by a covering of great strength, conferring a power of preservation and transportation, even greater than that allotted to the orange.

The berries form a far larger and much more various class of fruits. It is here equally easy to convince ourselves that the fruit is a pure superfluity.

The number of dry, or insipid, or disagreeable berries, is far greater than that of the others, while the uses to the seeds are equally served, whether the object of these be simply perpetuation, or use to animals; and in these there are more contrivances than one, for effecting that which is attained through the division of the juice in the orange and in the raspberry. There is also a distinct mechanical separation, not only tending to prevent fermentation, but to confer firmness on the fluid. In others, that structure is so minute that it is not easily detected: consisting of a delicate cellular organization, resembling that of the vitreous humour of the eye, and equally giving to the watery fluid the aspect of a jelly or a mucilage. And in other instances again, there is a gelatinous or mucilaginous substance united to the acid juice; which, by preventing the intestine motions of the fluids, equally checks fermentation, as it also aids in producing that necessary solidity, which the protecting investiture alone would not have accomplished.

The grape, the gooseberry, and the currant, are instances under this head, which I need scarcely extend: but it is interesting to remark that where the berry is small, as in the red currant for example, these provisions for solidity and against fermentation, are nearly or comparatively dispensed with; just as they are in the acini, and in the orange, where there is little mucilage, and no cellular structure. And if the intention of these several inventions is thus proved, thus also do we discover, as in endless other instances, that creation does not indulge in useless superfluities, and that the same end is obtained through variety of contrivance.

[Maccullocн's *Proofs and Illustrations of the Attributes of God.*]

ON ECHOES.

There is, perhaps, not one of our readers but who has, at some period of his life, been charmed with the fascinating and often surprising effects of Echoes. The boy who shouts when passing opposite to any of the crescents or polygons forming some of the inhabited streets of London; the surprise experienced by the visitor to the Whispering-gallery at St. Paul's; the augmentation of sound produced by playing a musical instrument in a vaulted apartment; and the excited attention which a reader pays to the recitals of travellers, respecting the reverberation of the voice in the Hindoo caves near Bombay; in the central mausoleum of the Egyptian pyramids; and in other similar excavations, all show that echo is one of those occurrences which must not be omitted in enumerating the pleasant associations which smooth our path through life. A brief account of the origin and nature of Echoes may perhaps not be unacceptable to many of our readers.

Before the introduction of the Christian religion, and when the minds of men, having no definite ideas of a Deity to rest upon, were wont to ascribe immortal attributes to those powers or occurrences which they could not understand, echo was believed to be the voice of an invisible nymph, who, having pined for love, frequented lonely places, and repeated the name of her lover. There was something beautiful in the idea, but, like most of the poetic imaginings of the ancient Greeks, it possessed the worst of all faults, *i. e., it was not true!* By degrees more just notions of the cause of echo, as well as of most other natural occurrences, gained ground; and for many ages men have been well assured, that echo is nothing more than the reflection of sound from a solid surface.

Most of our readers are aware, that there is no such thing in nature as absolute space, that is, space quite unoccupied by matter of some kind or other. A vessel of any kind, which, in common every-day language, is said to be empty, is, as our readers know, full of atmospheric air. Now this may, by means of the air-pump, be almost wholly removed. The space enclosed by this vessel is now called *a vacuum*, but not correctly so, since the air-pump cannot remove all the air: and it is probable that in nature there is no such thing as a vacuum, or absolutely empty space. When, therefore, we blow into a flute, or through a trumpet, we disturb the air which exists in the cavities of those instruments; and when the effect of that blast has reached the further end of the tube, we are justified in asking, "what becomes of that disturbance, and how is it that the effect thereof reaches the ears of the player and of others near him?" The answer is, that if the room in which the player were situated contained no air, no sound whatever would be heard; he might blow until he were exhausted, but he would hear no effect from it, —all would be dead silence; but, when the room is (as it invariably is) filled with air, the particles of air nearest to the instrument become agitated by the blast through the tube; they disturb the particles next to them, these latter convey that disturbance to others still further remote, &c., until, at length, every portion of air in the room, however large it may be, becomes agitated: the next step is, that the particles which happen to be nearest to the ear of any person in the room, impart their trembling motion to a sort of drum, situated in the cavity of the ear, about an inch from the surface, and called the tympanum * of the ear.

What we have said of the effect produced by blowing into a flute or trumpet, is equally true if the disturbance be brought about by any other means. If we sing, talk, cough, touch the string of a guitar or harp, draw a bow across a violin-string, clash a pair of cymbals together, vibrate the strings of a pianoforte by pressing down the keys, strike an anvil with a hammer, draw the teeth of a saw across a piece of wood, or those of a file across a piece of metal, or produce a vibratory motion of any kind in a substance surrounded with air, that vibration and disturbance will be imparted to the air, and from it to the tympanum of the ear, and then we say we hear the sound of the cymbals, violin, &c., for it must be understood that each sort of sound has the property of affecting or agitating the air in a manner peculiar to itself.

Knowing now that we should be incapable of hearing, were it not that air exists between the sounding body and our ears, we may naturally ask, "Do we hear a sound as soon as it is produced, or does it occupy an appreciable time in reaching the ear?" Any one who has seen a gun fired, or who has seen a flash of lightning, can answer this question; the spark is emitted from the flint at the same time that the discharge of the gunpowder (which produces the report,) takes place, and yet a spectator some hundred yards distant sees the spark before he hears the sound. Again, the rapid passage of electricity through the atmosphere produces light, and the consequent disturbance of the particles of air produce sound at the same instant, and yet we see the lightning before we hear the thunder. This must show us at once that sound travels more slowly than light. For all common calculation the passage of light may be considered instantaneous, inasmuch as it moves with a velocity of about 200,000 miles in a second, (that is, equal to eight times the distance from England to the

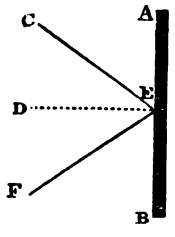
* Tympanum is the Latin word for drum.

East Indies and back again, between two ticks of the pendulum of a clock). We shall, therefore, be not far in error in saying, that we see the flash of a gun the instant it is produced.

Now it has been ascertained, that when a cannon was fired on one hill, the observers on another hill heard the report four seconds after the flash appeared; and, on measuring the distance, the hills were found to be 1500 yards from each other. The sound, therefore, took four seconds to travel 1500 yards, which makes 375 yards, or 1125 feet, per second, that is about three times the height of St. Paul's. The writer of this article has frequently heard the drum, which forms part of the military band on duty in St. James's Park every morning, at a distance of two miles from that spot; the sound, therefore, was heard about nine and a half seconds after it was produced, and all the air between those two stations was agitated by that sound.

These are instances in which there is nothing to stop or impede the progress of the sound; but, suppose a person to be standing in front of a high wall or smooth rock (for smooth surfaces reflect sounds much better than rough ones), and to shout, or to produce a loud sound by any other means, he would, by so doing, agitate the air near him, and that agitation would spread itself further and further until it reached the wall, where it would meet with a solid obstacle to stop its further progress. Now it might be supposed that the agitation or vibration of the air would terminate here, but it is not so; it immediately begins to travel backwards in the direction in which it came, and would strike upon the ear of the person who uttered the sound, as if the sound itself came from the wall instead of from his own voice. This backward travelling of the sound is called *an echo*, and however various may be the circumstances under which an echo is produced, we may always be sure that there is a surface which reflects or drives back the sound which is produced. Some surfaces do so better than others. The perfection of this reflection depends often upon the form of the reflecting surface. A convex surface is a bad reflector, a flat one is a good reflector, but a concave surface is best of all. The surface of water and even clouds sometimes act as reflectors of sound.

But now we have to inquire, whether, if two persons be placed in front of the wall, and at some distance from each other, they will both hear the echo, or if not, which of the two will hear it? This will altogether depend upon whether the surface of the wall is immediately fronting the observer, or whether it be in a slanting or oblique direction; if the latter be the case, the speaker will never hear the echo of his own voice. We shall be able to illustrate this by reference to a popular sport with which many of our readers are no doubt acquainted. Suppose C D and F to represent three persons playing at racket or fives, and A B to be the wall against which they strike the ball; if D wishes to strike the ball in such a direction, that it shall return back again to him to receive the second blow, he will strike it straight forward towards E, knowing from experience that if he strikes it in a sloping direction, either to the right or left, it will not rebound back to him again. If the player C wish to strike it so that the player F shall have the next opportunity, he will not send it towards A, but he will send it in an oblique direction towards E, expecting (and he will not be disappointed in his expectation), that it will rebound to the position F.



Now it did not require any mathematical reasoning to convince these players how to attain their object; they learned it by experience, by observing that unless they directed the ball towards a certain point, it would not rebound to the position which they required: and we hope to be equally able, without using scientific language, to show that echoes occur in just the same way Suppose, instead of a wall A B, that we had only a small portion of one near A, and that the person situate at C were to utter a loud sound, he would then hear the echo of his own voice, because the surface at A is just in the position to reflect the sound directly towards him, but the person at F would not hear it at all any more than he would have received the ball had it been propelled towards A. But now suppose that the surface of rock or wall is at E B instead of A, in that case the speaker at C would not hear the echo of his own voice; because, after encountering the wall, the sound would rebound towards F as the ball would have done had it been struck to the point E.

There is a scientific mode of expressing the direction in which the reflection will take place, by saying that the "angle of incidence is always equal to the angle of reflection," which in familiar language means, that however slanting the ball may approach the wall, it will rebound in an equally slanting direction. But let any two of our young readers personate the players C and F for a short time, and they will acquire a clearer notion than books can give them of the direction in which echoes are reflected.

If, instead of two fragments of wall at A and B, the whole wall were perfect, persons variously placed before the wall would each of them hear an echo from some point or other; but it must be borne in mind that each person would hear an echo from one point only. Understanding now that sound travels at the rate of 1125 feet per second, and that echo is merely the reflection of a sound from an opposing surface, we will in a future number give instances of various kinds of echoes.

VEGETATION, when assisted by human contrivances, is the best possible means of improving the air, and rendering a country fitter for the abode of mankind. Cultivation removes the corruption and decaying vegetables; and by turning them under the earth, makes them nourish the ground instead of poison the air. Many British colonies, at one time so deadly, are now healthy, not so much from the care of the new-comer, in avoiding the remote causes of disease, as from the greater number of these causes being removed by cultivation. I mean here, by *cultivation*, that treatment of the land by which it will furnish the largest possible quantity of food for man and the domestic animals he employs; wherever we find corn capable of growing, that country is, or by human labour may be made, healthy. Cultivation, likewise, always renders a country *warmer*, for a large quantity of vegetable matter is raised on a given space; and what is vegetable life but the conversion of certain gases, oxygen, hydrogen, azote, and carbonic acid into solid mater, and a change of form—an alteration from a rarer to a denser state—which must be accompanied by the extrication of heat? What is it that makes living vegetables so difficult of being frozen, compared to dead ones, but this constant formation and existence of caloric in them? As an example of the evolution of heat, by the process of vegetation, it may be mentioned, that on looking into a wood in spring, we shall find the small plants more advanced in size and strength than those of the plains.—?

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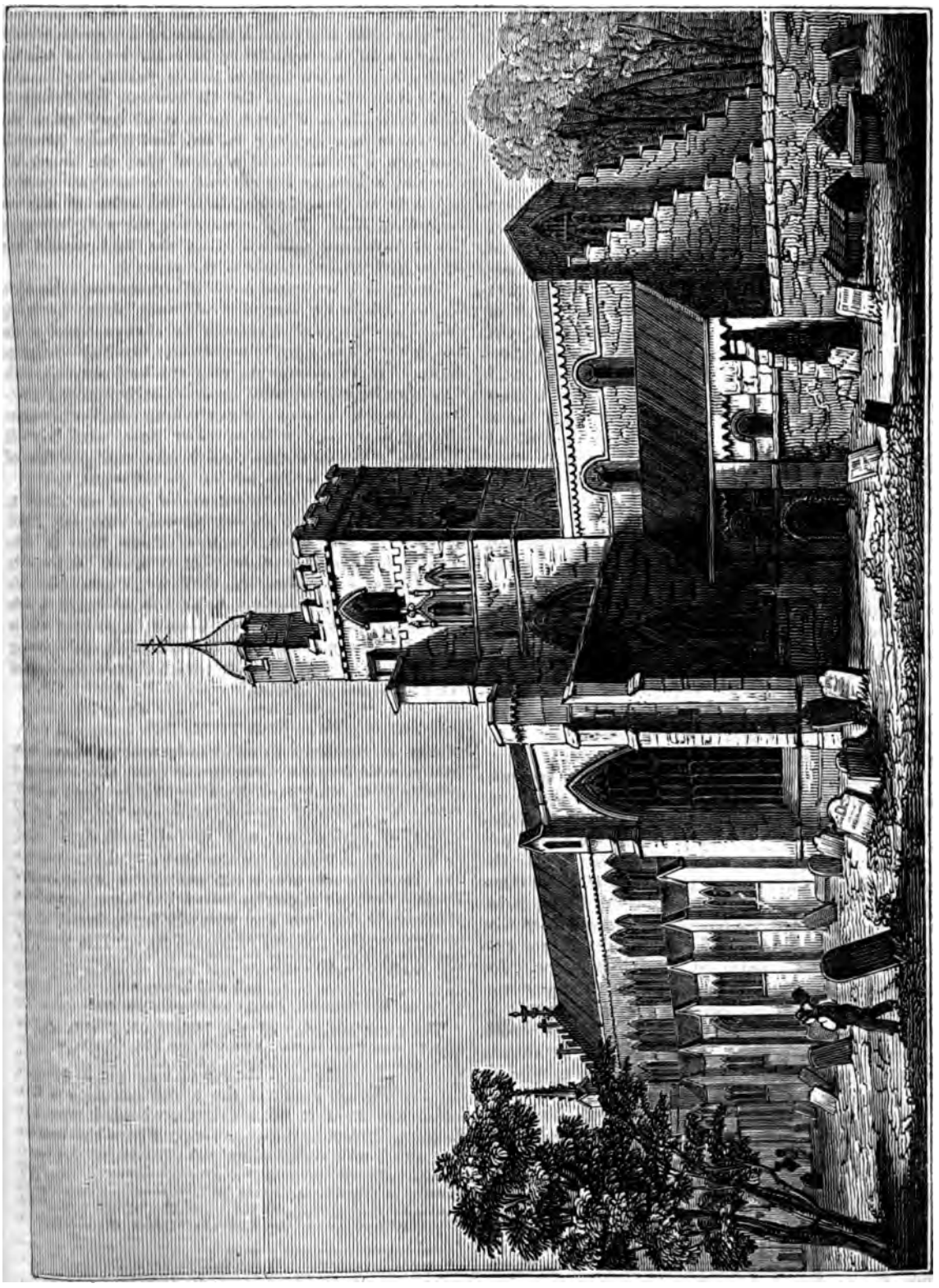


CARLISLE CATHEDRAL.

CARLISLE CATHEDRAL.

TANNER gives the following account of the origin of the ecclesiastical establishment at Carlisle.

Several writers of St. Cuthbert's life, tell us of that holy man's founding here, A. D. 686, a Convent of monks, a School, and an Abbey of nuns; but from Bede's life of St. Cuthbert, it seems as if the monastery here to which Queen Ermenburga retired, was in being before St. Cuthbert's coming to Carlisle. But all these ecclesiastical buildings, with the city and adjacent country, being laid waste in the Danish wars, the city was rebuilt and fortified by King William Rufus: and Walter, a Norman priest, being made by that king governor of the city, began a monastery to the honour of the Virgin Mary: which was finished and endowed by King Henry the First, who placed regular canons therein, and when he had established the Bishop's see here, made this church a cathedral: but it is observable that this was the only episcopal chapter in England of the order of St. Austin.

King Henry the First, before the foundation of the bishoprick, was a benefactor to the priory; and Kings Henry the Third, and Edward the First, bestowed large possessions on the Bishop and Church. The first Bishop of Carlisle was Athelwold, who was consecrated in 1133, and died in 1156. The cathedral was built at various periods, and displays specimens of different styles of architecture. The length of the choir is 137 feet; its height 75; its breadth, together with the aisles, 71. The breadth of the transept is 28 feet; its length 124. The height of the square embattled tower in the centre, between the nave and transept from the area of the church, is about 130 feet.

Although this edifice is partly surrounded by buildings and trees, there are several points of view in which it may be seen to advantage. The cathedral was originally a complete cross-church, and had cloisters and a chapter-house. The greatest part of the cloisters, and a large portion of the nave, were destroyed in the civil wars; the two remaining aisles of the nave are fitted up as the parish-church of St. Mary. This part is Norman, of a simple and massive character; but the greatest portion, eastward, is early English, of elegant design, parts being much ornamented with foliage, &c. The east end is decorated, and seems to have replaced a front of earlier date. The transepts are narrow and short, and have no aisles, but there is a small chapel east of the south transept, dedicated to St. Catherine, which was founded and endowed by John de Capella, a citizen of Carlisle. The choir consists of seven arches, with a small one eastward, which spring from clustered piers with rich capitals; it has aisles, and is considerably wider than the nave. The choir was begun by Bishop Welton, in the reign of Edward the Third, and finished by the succeeding bishops, Appleby and Strickland, the expenses being chiefly defrayed by subscriptions. In arches, formed in the walls of the aisles, are some monumental effigies mitred, but the persons whom they represent are not known. The tower is small and low, and coincides with the centre of the nave. The early English clerestory windows have been filled with tracery of a later date, and there are a few perpendicular windows inserted in the aisles. The east front contains one of the finest, if not the finest, decorated window in the kingdom. It is much decayed, but its elegance of composition, delicacy of arrangement, and the harmony of its parts, rank it even higher than the celebrated west window of York Cathedral, which it also exceeds in the number of divisions, as it has nine lights. This window, which is fifty feet high and thirty broad, fills the space between two very bold buttresses, crowned with fine pinnacles which rise above the ridge of the roof. Over the great window, is a small one of rich tracery to light the roof.

The chapter-house and cloisters stood on the south side of the cathedral. Part of the dormitory is still remaining, as well as the refectory, which is now used as the chapter-house. The priory-gate is also standing, and in tolerable repair. It was built by Prior Senhous, in 1507. L. Salkeld was the last prior, the priory having been dissolved in 1540 by King Henry the Eighth, who, in its place, erected and incorporated a dean and chapter, by the name of the Dean and Chapter of the Holy and Undivided Trinity of Carlisle. Salkeld's initials appear upon several parts of the carved work in the choir of the cathedral.

On the north side of the choir, near the communion table, is a curious monumental brass plate, erected to the memory of Dr. HENRY ROBINSON, who was born at Carlisle, about the year 1556, and afterwards became Bishop of the diocese. The eminence to which this person attained from an humble beginning, supplies one among the many instances of the great rewards which are thrown open in this country to professional labour and merit.

Henry Robinson was educated at Queen's College, Oxford, where he was at first only "a poor serving child," but afterwards became Provost of the college, and conferred distinguished benefits on that establishment. He is designated on the tablet, as a "most watchful Bishop of this Church for eighteen years." Near the top of the plate an angel is represented, bearing a scroll, inscribed "Τοις Επισκόποις," "*To the Bishops.*" And above it is the following passage, in Latin, from St. Luke, having allusion to episcopal vigilance; "*And there were in the same country shepherds abiding in the field, keeping watch over their flock by night.*" The main features of his history, as a clergyman, which are here portrayed, appear so pleasing and honourable, that we cannot forbear describing them briefly. Over the *entrance* of the cathedral, as represented on the brass, are the words "Intravit per ostium," or "*He entered in by the door.*" On a label across the entrance is, "Permansit fidelis," "*He remained faithful unto the end.*" And below, on the steps, "Recessit beatus," "*He departed blessed.*" The bishop also appears in his full episcopal dress, with a pastoral staff in one hand, and in the other a lighted candle and a cord: to the cord three dogs are attached, guarding as many sheep-folds from wolves. Below is a group of figures, who are holding implements of agriculture and useful industry. Near them is a wolf playing with a lamb; and various warlike instruments are lying scattered and broken. These prophetic illustrations of the blessings of the MESSIAH'S kingdom are properly introduced, as attending on the faithful ministration of His word, by His appointed servant,

> and well become
> The messenger of grace to guilty men!

The most eminent of the bishops of this diocese was JAMES USHER, Archbishop of Armagh, in Ireland, who had leave to hold the see of Carlisle in addition. He accordingly received the administration of it in 1641, and held it till his death, which happened at Reigate, Surrey, in the year 1655. From this time the bishoprick of Carlisle remained vacant for five years. At the restoration it was conferred on Dr. RICHARD STERNE, afterwards archbishop of York. The Hon. and Right Rev. HUGH PERCY, D.D., is the present bishop.

To the cathedral belong a Bishop, a Dean, a Chancellor, an Archdeacon, four Prebendaries, a theological lecturer, five Minor Canons, four lay clerks, six choristers, and six almsmen.

FRUITS DESIGNED TO BE A SOURCE OF ENJOYMENT TO MAN.

No. II.

THE apple furnishes a familiar model for another class of fruits, though the variety under it is very limited. If this structure should be considered as a mere protection for the seeds, it would be a very superfluous one; and the real intention is not less visible. In the case of the cashew, externally resembling the apple, if botanically differing, the fruit is an absolute superfluity; since it does not even enclose the otherwise fully-protected seed. If the cellular structure of these fruits checks fermentation, as in the former cases, while conferring an almost incredible firmness, when the small proportion of solid matter is considered, there is a further provision, for the preservation of the apple at least, through that exudation, too often carelessly removed, which, by forming a varnish, excludes one of the most active causes of destruction. The strength and compactness of the very thin, yet secure epidermis by which these fruits are protected, ought also not to pass unnoticed.

The cherry and the peach are examples under that class of fruits which botany terms a Drupa. Here, the superfluity is very striking, because the seed is completely protected by the stone. For all purposes to this essential part, every drupa might have been a filbert, or at least a walnut, where the external covering is not a fruit. And here also we must admire that cellular structure through which the purposes already named are accomplished: while in the peach in particular, the firmness is exceedingly remarkable, when the actual quantity of fluid in the total bulk is considered. And it must not be forgotten that in every one of these instances, this often apparently impossible problem has been solved for purposes of utility: if also variously solved, as if to evince resource. A fluid was the thing to be produced; but that was to be rendered transportable and durable: and by means that almost appear magical, it has been made to assume the form of a hard and resisting solid.

The general principle of all the fruits which seem intended for gratification, is chemically simple and uniform. As far as mere taste is concerned, it consists in all, fundamentally, of a mixture of sugar and acid, differently proportioned, and more or less diluted. The orange alone will, at different stages of ripeness, illustrate these differences; as the red currant and the greengage plumb are, in our own fruits, examples of the opposed extremes. Speaking however with chemical rigidity, the sugar is not always that of the sugar-cane: in the fig and the date for example, it approaches in quality to manna. The acid portion appears to comprise many more acids than chemistry has yet ascertained: but it is familiar with at least the malic, oxalic, citric, and tartaric; while, as far as our experience goes, the two last appear to be the most general. The mucilage, constituting the only other general principle, seems only to modify the taste of these compounds; or, like water, may be considered as a diluent, otherwise at least than as it is a nutritive substance.

In the fig, this forms a very large ingredient: if it abounds in some grapes, it is nearly wanting in others, and in the orange the quantity is still more minute. This then is all: sugar, acid, mucilage, or jelly, and water: and as these variously prevail, we have all the range in quality in fruits from the thin acid currant, to that beautiful proportion which constitutes the grape, to the powerful mixture of sugar and acid in the pine-apple, and the almost total absence of the latter in the fig.

Even thus far we might fairly suppose an intention of beneficence, in the varieties of taste thus produced: as all the useful qualities might have existed under one variety, just as the nutritious properties might have excluded, not only variety, but taste itself. This, however, is far from all that has been done for our pleasure; since there yet remains to be noticed that most mysterious compound, or set of substances, forming the principle of flavour, of which chemistry can give no account; transcending as they do, and perhaps ever will, our power of analysis. Be they what they may, they have been ordained and provided; while their relations to the sense of taste, so as to produce pleasurable impressions, must be arbitrary, or solely dependent on the intention and command of the Creator.

We are not indeed sure that the whole of these peculiar provisions have been made for man alone. It would be indifferent as to the present argument, though other animals partook with us of these enjoyments; but the indifference and distaste which they show to the flavours and odours which we enjoy, with their frequent attachment to those which are disagreeable to us, point out, in those cases at least, that the beneficent appointment has been especially intended for man.

And it is through the principle of flavour that there has been produced a far greater range of variety in fruits, than any modification of their fundamental elements could have effected; while it is through this also that all that delicacy of quality which attracts us most in these productions, has been conferred. No power but the Highest could have created what it passes human imagination to conceive, as well as human knowledge to assign; and no wisdom but His could, through the addition of imponderable, inseparable, unintelligible, have wrought out such a variety of ends. Deprive the finest fruits of their flavour and they are nothing: sweet, sour, and mucilaginous. Such is often the result of our imperfect climate; and thus, even the peach falls beneath the apple. Without this, the cheremoya and the mangosteen would be nothing: as the pineapple might almost be represented by a mixture of our own making.

And has not all this superfluity, so varied, so constant, so delicate, so difficult to understand, been appointed for us and for our pleasures? Has it not been appointed by Him, the powerful as the beneficent, when it is all the result of organizations so minute and abstruse, and of chemical actions so obscure and so wonderful, that all equally eludes our faculties and confounds our reasonings? Chance, it is not; and it is not necessity: for all other animals it is purposeless: it is a source of enjoyment to us: and whence then again are the pleasures which we do enjoy, if God has not given them, if He did not thus provide for our happiness? Yes, even in things so minute and so low as this, which we must not shun to think of, from false or affected views of Him, to whom man, altogether, is as the gnat of a day's life, equally under His care and protection, lest it should lack its food and its happiness, and fail in its generations. Between Him, the infinite, and all beneath, all distances are alike: he watches indeed over the eternal welfare of man; but He also feeds the raven, and protects the sparrow. He has told us so: it is not impiety which strives to view him in everything: it is not piety nor religion that would exclude Him from any thing.

I must here notice the grape, as a special object of interest to man, and to him exclusively. How often it is alluded to in the writings of Divine origin, as being no less a gift to him than the most essential

articles of food, I need not say. But all the world has known from all times, that its familiar produce is as useful, as the instinctive desire for it is universal, under the inducement of immediate enjoyment. Like all else, indeed, it is liable to abuse, with consequent evil; but a sound philosophy can assign ample reasons for its utility; as a rational study of the constitution of the human mind, and of the conditions of the mental powers and the feelings, under the casualties of life, can no less defend and explain its moral value, independently of the mere enjoyment resulting from its use. And if the grape seems to have been peculiarly contrived for a purpose less easily attainable than otherwise, through a constitution not less remarkable than the wide diffusion of the plant and the abundance of its produce, while, further, so declaring its own uses, that man could scarcely have known it without discovering that it was ready to produce wine, it is not possible to doubt that it was appointed and destined for him to whom alone it is useful, or even acceptable; and that it really is what we have been assured, one of the especially beneficent gifts of a bountiful Creator.

If more could be necessary towards establishing the peculiar care of God for the human race in the invention of fruits, the following general fact must set the question entirely at rest. That the means of procuring enjoyment have been very generally rendered dependent on man's own industry, and on that accumulation of knowledge through his races, which is the result of successive and continuous industry, has been often shown. And when he thus produces any specific source of enjoyment, we must believe that it was designed, because the general result was intended. The laws of nature, as they are termed, have, to a certain degree, been left at his disposal: he is allowed to change the ordinary course of creation for his own profit. Had that not been permitted, or rather intended, it could not have been: and we are assured that it has, when the consequences, forming man's stimulus, are the reward of his exertions. And if, in any case, we find that latent provisions have been made for the production of what would still never have occurred but through his assistance, much more must we believe that the intention was for him, even under a double design of beneficence; since the needful exertions were essential, equally, to his physical welfare and his moral improvement.

[Abridged from MACCULLOCH's *Proofs and Illustrations of the Attributes of God.*]

THE changes which the art of the florist induces, in producing double and variegated flowers, are not to be compared with the effects of cultivation on those fruits and esculent vegetables which have been for ages under the care, and as it were the peculiar property, of man. In a wild state, indeed, they are hardly to be found at all; or *if* found, hardly recognisable. From an insignificant and acid fruit, or rather a mere berry, (for the fruit of the wild crab is nothing more,) have been produced, it is supposed, all our large and delicious varieties of apples; the colewort, a plant whose scanty leaves weigh not more than half an ounce, is said to be the original of the cabbage; the potato was but a small bitter root, growing wild in the regions of Chili. What encouragement do not these facts afford to the cultivator who seeks to reclaim other vegetables to the use and dominion of man? and if he is, as he has been said to be, a benefactor to his race, who makes two blades of grass grow in the place of one, is not he one also, who gives them a new fruit, or teaches them the use of a new plant?

IT is a pleasing task to register the actions of those men who are zealous in the pursuit of science, and who derive their chief gratification from the virtuous pleasure they afford others. They should ever be held up as models for the stimulus of future generations.—MAUND.

MACHINES FOR RAISING WATER.

II.

THE invention of the pump is so distinct in principle from any other description of machines for raising water, and so superior as an effort of science, that we must naturally conclude it was the latest invention for the purpose for which it is intended. Nothing resembling the pump has been found among any of the nations of the New World: it was unknown to the Romans, even in the rudest form, until the latter end of their empire; the ancient Egyptians were unacquainted with it, and even the Chinese have no invention resembling it. The inventor is said to be Ctesibius, a celebrated mathematician of Alexandria, about 120 years before Christ. From this invention, the principle of which was of the same nature as that of our present pump, all our modern improvements have to date their origin. Even at the present day, the pump is rarely met with in any portion of Asia.

The action of this hydraulic machine depends principally on the effects of the pressure of the atmospheric air. Suppose fig. 1 to be a tube bent up at the lower end, and more than thirty feet in length; if this tube is filled with water, and the opening at the top securely closed, although the bent end is open, a column of water will still remain in the tube, thirty-three feet in height above the level of the open mouth of the tube; but if the upper end is opened, the whole of the liquid will run out, excepting so much as will fill the bent portion of the tube, as shown by the dotted line.

Fig. 1.

There are but two sorts of pumps which essentially differ, and all the varieties we see are only modifications of these; the one is usually called a *forcing-pump*, and has a solid plunger or piston; and the second kind a *sucking-pump*, in which the piston has an opening fitted with a valve.

Fig. 2 is a section of a forcing-pump of the simplest construction. D is the reservoir of water from which the supply is drawn; the solid piston A being first forced down to the bottom of the tube in which it works air-tight, is drawn upwards, the pressure of the air on the water in the well causes it to rise in the tube, following the upward course of the piston; as soon as the piston has completed its upward stroke, it is forced downwards: this causes the valve at B to close, and prevent the return of the water, which, having no other means of escape, is forced upwards along the pipe C, and discharged at any opening that may be left for the purpose, in the course of its length: the piston is again drawn up, the valve opens, and the water follows, and is again by its downward pressure driven up the pipe C

Fig. 2.

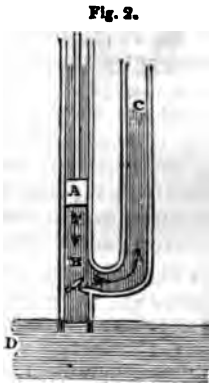


Fig. 3 shows the principle of the lifting-pump. A is the piston which is perforated and furnished with a valve, (see fig. 4,) which is a section of a common piston. A represents the hole through its substance, and B is a valve opening upwards; the water in this case must be sufficiently high to cover the piston when it is at the lower end of the tube. If the piston is now drawn up, it will carry upwards all the water that is above it, and the water from below will also

follow it, being pressed upwards by the weight of the atmosphere. On the return of the piston downwards, the water which is between it and the valve B, fig. 3, will be unable to return to the well, on account

Fig. 3.

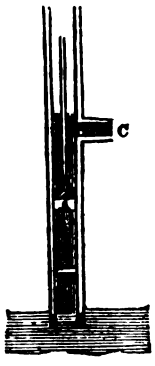


Fig. 4.

of the closing of that valve; the piston will easily move downwards through the water, the valve with which it is furnished opening upwards: thus at each stroke the water above it will have accumulated, and at each upward movement it has to lift a greater quantity, and this goes on increasing until it is above the level of the opening at C, through which it will then run.

Having thus explained the principle on which the two kinds of pumps are constructed, we shall illustrate the subject by a description of several pumps of different constructions. The following construction of the forcing-pump illustrates the principle on which the pumps attached to fire-engines are made. In fig. 5 the pump is supposed to be formed of glass, to show its internal construction. A is the solid piston moving in the cylinder of the pump, and made air-tight. B is a valve opening upwards, and placed at the end of the pipe which leads to the water in the well; the pipe C opens into the space which surrounds the upper portion of the pipe, on the top of which the valve B is placed. The water, as in the common forcing-pump, is driven along this pipe, and forced into the vessel D; a small pipe F is introduced into this vessel, and reaches to within a short distance of its bottom: as soon as the water which enters this vessel is above the level of the lower part of the pipe E, the air which D contained, which in the first instance was expelled through that pipe, will now become compressed in the upper part of the vessel, and thus act like a powerful spring, sustaining the jet of water between each stroke of the piston.

Fig. 5.

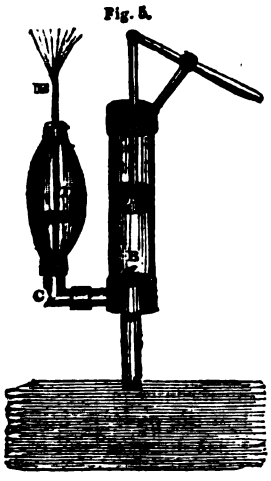
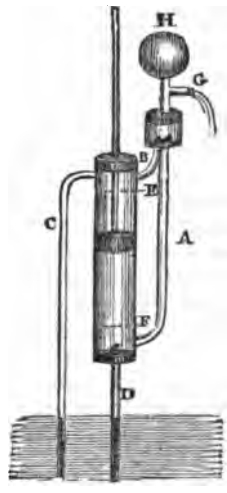


Fig. 6 represents a very ingenious pump, in which the piston acts in a double capacity, as a forcing and as a sucking piston. The four pipes, A B C D, all communicate with the large cylinder, and are each furnished at their upper extremity with a valve opening upwards; the piston of this pump is solid, and is not allowed to be raised higher than E, or depressed lower than F in the large cylinder. When the piston is forced downwards, the water with which we are to suppose the lower part of the cylinder was filled during its last ascent, is forced up the pipe A, and ultimately out at the spout G. During its last ascent it had forced the air in the upper part of the cylinder through the pipe B, and the valve at the top of this pipe falling down, would prevent its return during the descent of the piston. The consequence would be that a vacuum would be formed above the piston, and the atmospheric pressure would force the water up the pipe C into the unoccupied space. At its next return the piston would force out the water in the same manner as it did the air in the first instance, and in its next descent again produce a vacuum, thus acting at the same time as a forcing and sucking pump. When the supply of water has become sufficient to allow it to accumulate above the internal opening of the spout G, the air in the vessel H would become compressed, and act in the same manner as the condensed air noticed in the account of the last engine described.

Fig 6



ON THE EARLY MODES OF MEASURING TIME.

II.

Divisions of Time. (*Concluded.*)

Among the nations in which astronomy was first cultivated, was Chaldea, and it is natural to suppose that the first division of the day into *hours* was adopted by that people; for it would obviously be difficult to compare the times of the appearance of the heavenly bodies with so large an unit of time as five or six hours. The first division was into twelve hours, but that was afterwards replaced by a division into twenty-four hours. They began their day at sunrise, and reckoned on twenty-four hours to the next sunrise: in fact, according to our mode of naming the hours, we should say that their day commenced an hour before sunrise, because the hour of sunrise was reckoned one. It is probable, however, that, instead of employing the numbers to denote the divisions between these twenty-four periods, they applied them to the periods themselves, calling them "the first hour," "the second hour," and so on: in this sense, the notation would begin and end at the moment of sunrise.

The Egyptians computed their hours in a manner somewhat similar to our own; that is, they began the day at midnight; but here the similarity ends, for, instead of reckoning twice twelve hours, they went through the whole twenty-four, like the Chaldeans and Babylonians. The first mention of *hours* in the Bible occurs in Daniel iii. 6; and v. 5: in these cases, however, the word *time* or *moment* would convey the same meaning as the word *hour*; but, as the Jews obtained their notions of the division of the day into hours from the Chaldeans, when they were carried into captivity to Babylon, and as Daniel lived at that period, B.C. 570, it is probable that the sentences just alluded to really related to *hours*.

The Jews, however, deviated from the plan adopted by their instructors, inasmuch as they began their day at sunset, instead of sunrise, and reckoned two series of twelve hours each, instead of one series of twenty-four hours. These two series extended, one from sunset to sunrise, and the other from sunrise to sunset; and, as each period was divided into twelve

equal parts, it necessarily followed that the night-hours were longer than the day-hours in Winter, and shorter in Summer, in consequence of the difference in the hour of sunrise: the word *hour*, therefore, had not the same definite meaning with them as it has now with us. The night was divided by the Jews, before their country became subject to the Romans, into *three* watches,—called in Latin "Vigiliæ,"—consisting of four night-hours each. These Vigiliæ were afterwards increased, under the Romans, to *four*, viz., *Even, Midnight, Cock-crowing*, and *Morning*.

In the Earlier ages of Greece, it does not appear that hours were known; for Homer speaks of Morning, Evening, and Midday, in a manner analogous to that of David. Hippocrates is said to have brought the horary division of the day into practice in Greece, from having observed it in Egypt. There seems reason to believe that many of those nations which had no communication with the Chaldeans, reckoned the progress of time by *Nights*; for Tacitus speaks of that mode of computation, as having been in vogue among the ancient Germans. The same remark was made by Cæsar, with respect to the ancient Gauls; and it is known at the present day that some of the nations of central and southern Africa, the Mashoos, for example, reckon time by the lapse of nights. Indeed our own household words, "se'nnight" and "fortnight," seem to be surviving proofs that a practice somewhat similar was once prevalent in Britain.

Confusion is sometimes created by applying the term "day" both to the whole twenty-four hours, and to that portion of them during which the sun is above the horizon; it has therefore been proposed to use the word "Nycthemeron" for the former,—thereby confining the term *day* to the latter. *Nycthemeron* implies *day and night* together.

The origin of the names of the days of the week is a curious sample of the influence which Astrology exerted over the minds of the "ruling powers" of those days. The seven primary planets (for *then* they were *all* called planets) Saturn, Jupiter, Mars, Sun, Venus, Mercury, and the Moon, were believed to take it in turn to preside over the affairs of the world, each one ruling for one hour, and then giving way to the next. The day was named after the planet who happened to be in the ascendant at the first hour of that day. Thus Saturn was said to be the ruling planet at the first hour of the Jewish sabbath; the sabbath was therefore named, after him, *Dies Saturni*, or the day of Saturn. The eighth, fifteenth, and twenty-second hours of that day, would likewise come under the dominion of Saturn; the twenty-third under Jupiter, the twenty-fourth under Mars, and the first hour of the following day under the Sun,—from which arose Sun-day, or *Dies Solis*. Proceeding in a similar manner, we find that the seven days, reckoning from Saturday, came in the following order:—Saturn's day, Sun's day, Moon's day, Mars' day, Mercury's day, Jupiter's day, and Venus' day; and from these titles the Latin names of the week were derived. The English names are well known to be derived from those of some old Saxon idols.

In many uncivilized countries at the present day, the computation of time by *moons*, or months, is adopted. But this only relates to large portions of time; for smaller portions may obviously be more conveniently computed by the arrival of the sun at the meridian, or the natural day.

The Jewish month was lunar, and calculated from the first appearance of the moon, on which the "feast of the New Moon" was celebrated. This was the beginning of the month. It was proclaimed *by* the sound of trumpets, and many additional sacrifices were offered:—hence the Psalmist says, "Blow up the trumpets in the new-moon, in the time appointed, on our solemn feast day." Psalm LXXXI. 3.

There is no particular reason why a division of the day into twenty-four hours should be preferred to any other: twenty or thirty-six, for instance, would be quite as well; but twenty-four having been chosen, other nations gradually adopted the same number, although they may vary in their modes of computing those hours. It was, however, obviously necessary to devise the means for measuring them equally. Varied both in principle and in details, have been the means invented for this purpose. The sun-dial, the clepsydra, or water-clock, the hour-glass, and wheel-clocks and watches, have been the chief contrivances: in some countries burning candles or torches have been employed for this purpose. Thus, in the age of our Alfred the Great, time was measured by the burning of candles:—and again, Beckmann, on the authority of an Arabian traveller, cited by Renaudot, states that in China, in the ninth century, a person appointed for the purpose, used to strike a board suspended from a string, as a signal of the lapse of each successive hour. Thunberg says that in Japan they burn matches made of plaited rope, with knots tied on it at certain intervals. When the match burns to a knot, a watchman strikes a given number of blows on a bell, in one of the temples by day, and goes about at night and strikes two boards together a certain number of times, to indicate the hour of the night: but how the hours were computed in the first instance, we are not informed.

Before we proceed to describe the three time-measuring instruments, universally used before clocks and watches, we will say a few words respecting an ancient building which seems to have been intended expressly for a *horologium*, or general indicator of time. This is the tower of Cyrrhestes Andronicus, an astronomer of Athens, which is known in the present day as the "Tower of the Winds." It is described by Vitruvius, an architect in the reign of Augustus Cæsar, who has left a work on architecture; and from a most minute examination of it by Messrs. Stuart and Revett, some years ago, it is evident that the greater part of it answers the description given by Vitruvius.

It is an octagonal tower of marble, originally about fifty feet high, which was surmounted by a brazen Triton, (no longer to be seen,) holding a wand in his right hand. This Triton acted as a weathercock, and turned on an axis by the moving power of the wind; pointing with his wand to the quarter whence the wind blew. To indicate what part of the compass that might be, a figure was sculptured in bas-relief, on a frieze, on each of the eight sides of the tower; which figure was emblematical of the kind of weather which generally prevailed during the continuance of that wind at Athens. The eight winds, and their emblematical representatives, were as follow:—

SOUTH, usually sultry and wet:—A young man emptying a jar of water.

NORTH, cold and stormy:—An old man warmly clad, and holding a conch, the mimic roar of which is often similar to that of a howling wind.

EAST, gentle, fruitful rain:—A young man with fruit and honey.

N. EAST, cloudy, wet, and cold:—An old man with kind of shield.

S. EAST, sultry and gloomy:—An old man in gloomy vestments.

S. WEST, blows from sea:—A robust man bearing part of a ship from the sea; it being an unfavourable time for sailing from the Athenian port.

West, warm and fruitful:—A young man lightly clad.
N. West, drying and blighting winds:—A young man, with a brasen fire-pot, strewing ashes and coals.

The names of the winds are written in Greek over the bas-reliefs; but the accompanying explanations are given by modern writers, the real meaning of some of the figures being matter of conjecture.

Under these bas-reliefs are eight sun-dials, all vertical in position, but different in their construction, according to the side on which they are placed. Delambre, the eminent French mathematician, has determined the construction of these dials to be rigorously correct, and to evince a complete knowledge of the principles of construction.

In the pavement of this tower have been observed channels cut, as if for the flow of water; and it has been conjectured, with much probability, that these channels were either for the supply of water to a clepsydra, or for carrying off the water from one: the clepsydra being for the indication of time at those hours and seasons, when the sun-dials were not available. Thus, this tower was in various ways available for showing the points of the compass, the direction of the wind, the hour of the day, (and most probably the seasons of the year,) by sun-dials, as likewise the hour by a clepsydra. It is all strongly indicative of the ingenuity of the ancient Athenians.

Its use at the present day is mournfully different from that of which we have just been speaking. The editor of the splendid work on Athens, by Stuart and Revett, to which we are indebted for these latter details, says, "This tower is now a Turkish chapel, called Teckeh, in which the Dervishes perform a religious ceremony. The Dance of the Dervishes, the offspring of a humiliating superstition, has been assimilated to the dances of the Corybantes, and the Salii. Osmanlees of all classes occasionally join in it, with the Mewlemi Dervishes. They pretend that during the stupor produced by its revolution, they enjoy an abstraction in the contemplation of the Divinity not always otherwise possessed. It is commenced by the officiators sitting on the ground in a circle, who to the sound of drums and ruder tambours, begin to groan and yell the words, "Alla! La illa ill Alla,"—"God! there is no other God but God." At the same time rocking their bodies to the time of the harsh discord. Soon they rise, and hand in hand commence their frantic dance: the howls increase, when suddenly one, as if possessed, breaks from the rest, and, with extended arms, begins to revolve with a sickening celerity, and is soon followed by his comrades. The horrid din increases, till at length the performers are compelled by exhaustion to relinquish their religious pastime, leaving on the minds of the astonished Frank spectators the impression of one of the most abject forms of artificial human degradation." Stuart's *and* Revett's *Athens.*

Having thus briefly alluded to the circumstances which led to the division of the day into hours, we shall continue the subject by treating separately of the Sun-dial, the Clepsydra, and the Hour-glass.

THE FOREST TREE.

Dropped by the squirrel or the bird,
Perchance the nut, from whence its birth,
Was by the rabbit's foot interred
Within the soft, moist forest earth.
Urged by its secret principle,
It burst from out its perished shell,
To seek the light and air;
And by the nibbling fawn unseen,
Its downy twin-leaved stem grew green,
And rose a sapling there.

Its roots stretched out, its branches spread,
Thickened its trunk, until on high,
Covered with leaves, its lofty head
Made fret-work of its spot of sky.
A wand the robin bent, now stood
The giant monarch of the wood,
Where stooped the eagle's flight;
Once trembling at the slightest breath,
It now scarce deigned to stir beneath
The tempest's fiercest might.

The deer amid its cool green gloom,
Sought refuge from the noon-tide heat,
And sounding in its leafy dome,
The thresher's warbled notes were sweet.
The sunbeams scarce could find their way
Through its thick screen, their spots to lay
Upon the roots below,
That wreathed deep, mossy nooks, where led
The quail her brood, when winter spread
His chilling robes of snow.

And nature's jewels, radiant things,
Loved the green sylvan place; the bee
Turning to harps its quivering wings,
With arrowy straightness sought the tree.
Floated the yellow butterfly,
A wandering dot of sunshine, by,
And nestling 'mid its moss,
The sky-tinged violet's fairy cup
Its draught of fragrance offered up
To airs that stole across.

Its branches formed the panther's lair,
When waiting for his deadly leap
And in its hollowed trunk the bear
Coiled his black form in torpid sleep.
Ages of Springs renewed its crown,
Ages of Autumns cast it down,
Till heaps on heaps were strown;
Lichens crept up its furrowed side,
Its very race of eagles died,
But still it flourished on.

But its time came: its figure dropped,
Leaves came no more in vernal days,
And threads of pale green moss were looped
Around its dry and shrunken sprays.
It stood a spectre, gaunt and bare,
Reaching a shrivelled arm in air,
To court the lightning's dart,
Until the tempest stooped, and cast
Its red sulphureous bolt at last,
And scorched it to the heart.

Then as the gust came whirling round,
It shook from root to pinnacle,
And headlong to the echoing ground
It hurtling, crashing, thundering fell!
Melting away, the fractured trunk
To a green moss-mound slowly sunk,
Until the soil crept o'er,
And, by its solemn mystery,
Took to itself the stately tree,
Which once it proudly bore.

Alfred B. Street.

THE BUSTARD, (*Otis tardus.*)

The Bustard is one of those birds which appear, in Europe, to supply the place occupied by the ostrich and its congeners in Asia, Africa, and South America. It belongs to the tribe of *running birds.* All the species of the bustard are heavy birds, and usually slow in their flight; but they can run on the ground with great swiftness, and they are never known to perch. The male of the common bustard, of which we are about to speak, is about three feet in length from the tip of the beak to the tail, and the dimensions of the female are one-third less.

The male bustard is one of our largest land birds, and Nature has provided it with a very curious appendage, the use of which is uncertain. This singular apparatus is a kind of bag or pocket, which is placed beneath the skin at the upper part of the

neck. The opening to this curious reservoir is under the tongue, and it is large enough to hold several pints of water; as the bird frequents dry and sandy plains where water is not to be met with, it is probable that this contrivance is intended to supply him with that wholesome liquid. According to Bewick, the water is also applied to another purpose; namely, to defend its owner against the attacks of birds of prey, over whom he ejects it with great violence. Montague, on the other hand, considers it intended to supply the female with water when sitting, and the young, after they are excluded from the egg; the female is unprovided with this water-bag. Bustards are found in some parts of France, in Italy, Germany, and, although very rarely at present, in England.

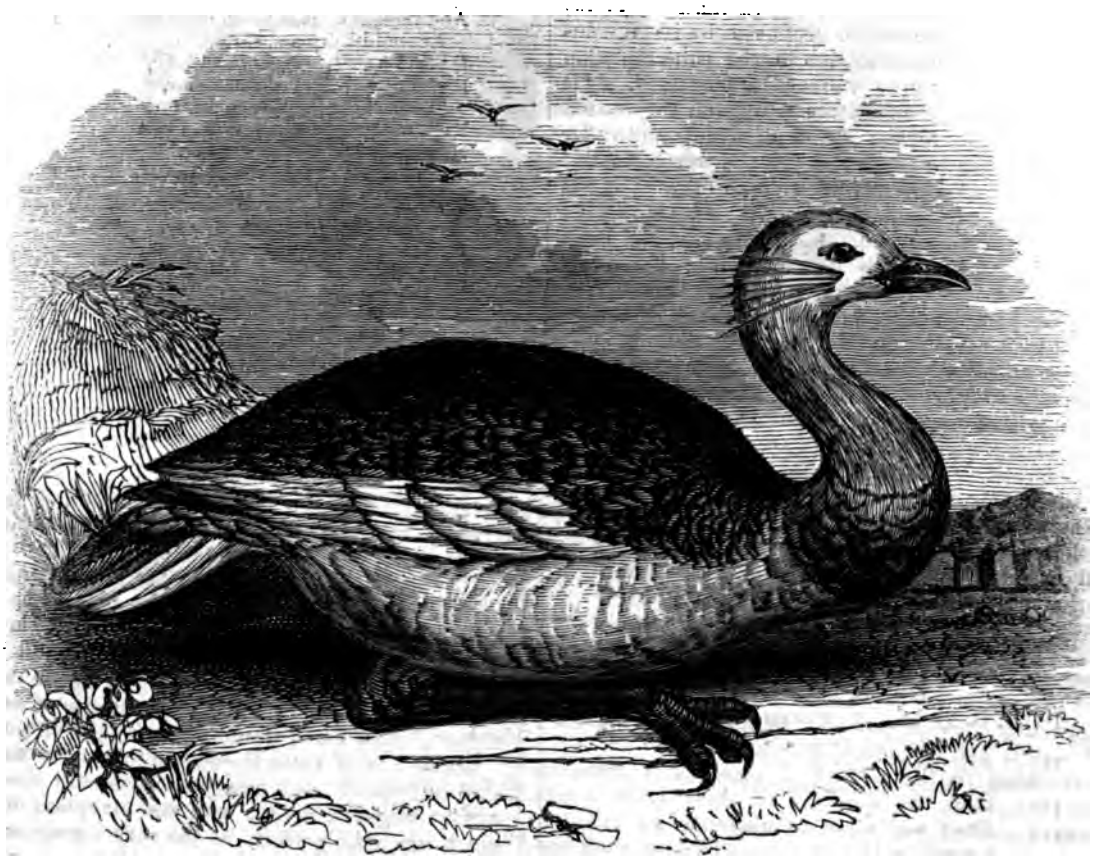
The food of the bustard appears to be usually different kinds of grain, but they also devour greedily mice, frogs, and lizards; and if we may believe a French author, they are as fond of pieces of metal as the ostrich. They lay their eggs in the month of May in a hole in the earth, generally in a field of corn. The number of eggs is believed to be usually two or three, and the time occupied in hatching them is about thirty days; they are about the size of those of a goose, of an olive-brown, with spots of the same colour, but darker. It is said that the female will desert her eggs if they are touched. The young, when they leave the egg, are covered with a white down. In some parts of the Continent the young are sometimes taken alive, and kept in confinement. They are then fed, in the first instance, with rye bread, mixed up with the yolk of an egg, afterwards with rye bread chopped up with bullocks' liver.

The bustard is now so little known in this country, that it may almost be considered as extinct. It is sometimes found, though very rarely, on Salisbury Plain, and on the coast of Norfolk. According to the French *Dictionnaire des Sciences Naturelles*, the bustards which are considered to be birds of passage,—

Arrive about the beginning of December, and remain only until the month of March, when they have to proceed further north; assembling in small groups, and sometimes in large companies, amounting even to thirty or forty; they betake themselves to the vast plains of Champagne, Poitou, &c.: but during severe winters, and when snow is abundant, they are generally distributed over the country, and keep more to the south. They prefer those spots which are remote from any habitation, and sufficiently elevated to enable them to discover the approach of danger when at some distance. They are usually hunted with dogs and horses, and the best time is supposed to be during a frost.

Before they are able to fly, they are obliged to run a considerable distance with the wings extended. As there is considerable difficulty in getting near them, several stratagems have been resorted to, to obtain that end, such as approaching them disguised in the skin of a cow, or under a moving covering of wood resembling a shepherd's hut. One circumstance in favour of discovering these birds is their habit of seldom wandering far from their usual place of resort.

The bustards, particularly the young, are highly prized as an article of food, and their feathers like those of the goose and swan, are used for pens. Some attempts have been made to domesticate the bustard, but the small number of their eggs seems to have rendered the task unprofitable. Pallas says, in his Travels to the South of Russia, that "the domesticated bustards in the Crimea have never laid;" and Montague, in the supplement to his *Ornithological Dictionary*, says that "they never could be kept alive in confinement more than two or three years."



THE BUSTARD.

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THE

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THE ROUND TOWERS OF IRELAND.

ROUND TOWER, KILDARE.

The reader is probably aware of the existence in Ireland of a number of ancient buildings, which, from their form, have been called *Round Towers*. Their origin is altogether a matter of conjecture; and since nothing certain is known on the subject, numerous theories have been advanced, and keenly contested by and among antiquaries. Our object in the present article is to offer a few brief particulars, respecting these remarkable records of the ingenuity of a rude and uncivilized people.

Nothing in the history of masonry is more instructive than the duration of these Irish Round Towers. They will serve to illustrate an excellent practice adopted by Mr. Telford, which we shall presently notice; they also afford an early instance of the practice of erecting lofty buildings *from within*, thereby avoiding the expense of scaffolding, as has recently been practised, with decided economy, in constructing steam-engine chimneys.

The height of an Irish Round Tower sometimes exceeds 100 feet; their average height may be taken at ninety feet. Their outward circumference is about forty-five feet at the base, where the thickness of the wall is from three to four feet, lessening upwards in a due degree to the summit. The expense of such an edifice (if now built) would not exceed 300*l.* or 400*l.*

About 120 of these towers are known to have existed in Ireland, and ninety of them still remain in various stages of decay, with the exception of a few which are still perfect, to the very coping-stone of the roof. Some of these slender edifices have withstood the wind and the rain, and casual injury, during

1000 years; for, although the too-frequent exaggeration of Irish antiquaries and historians has created very general credulity, and, consequently, inattention to what is really true of the western island, and of its comparative civilization at an early date, it is highly probable that these towers were built in the course of the 500 years preceding the Norman conquest of England; that they were Christian edifices, and in reality the bell-towers of ancient churches, is proved by their constant connexion with ruined churches and ancient burial grounds in Ireland, and, indeed, the Tower of Donoughmore exhibits a rude sculpture of our Saviour on the cross over its door-way entrance. In Scotland, which received Christianity from Ireland, the church of Brechin affords example of a Round Tower annexed to the south transept, and now entered from it. Over the original entrance of this tower, which was closed with masonry when the church was built, and another door-way made, is sculptured, in rude relief, the Virgin Mother and her Babe.

The origin of these towers is from the Greek Church; and the Turkish disciples of Mohammed adopted them under the name of minarets, as convenient for the same purpose of summoning the faithful to prayer, substituting merely the well-trained voice of the Mollah for a small bell, not permitted by their religion. In the decline of the Constantinopolitan empire, and long before the Turcoman invaders approached the capital, civilized occupations fled before them, and Greek architects were employed to adorn Italy with the magnificent churches and bell-towers of the middle ages. St. Mark's at Venice, and its adjacent campanile, are perhaps some of the earliest productions of the Greek fugitives, who afterwards, in the confidence of their art, not only built Round Towers in Italy, but even built some of them purposely out of the perpendicular, thus striking the mind of the beholder with an incongruous sensation of the known fact, of their long duration, and the appearance of immediate downfall.

There is no difficulty in supposing, that some of the emigrant Greeks were attracted by the fame of Ireland, then the learned and the pious, to settle there, and imitate, in a suitable manner, the parish churches of their native land in the East. Egypt, the most conspicuous member of the Greek church, was not likely to be deficient in religious edifices, and the most famous of her sainted hermits is distinguished as Simon Stylites, from his ascetic residence on the top of a pillar,—in fact, a Round Tower connected with religious purposes. All things considered, in a subject confessedly obscure, the best conjecture will, perhaps, attribute the date of the Irish Round Towers, to the four or five centuries of which the reign of Charlemagne may be taken as the middle point.

The duration of these slender towers is worthy the attention, not only of the antiquary, but much more of the architect. The first element of superior durability, is seen in the large solid basement, or substructure, which was almost unavoidable from the position of the door-way at some distance from the ground; nor could the small diameter of the interior have admitted the entrance of timber spars for successive ladders, unless thrust upwards from a surface lower than the door-way. Among the ninety towers, which, in various states of decay, are still extant in Ireland, there are probably various specimens of the builder's art; the generality consist of that kind of careful masonry, called *Spauled Rubble*; in which small stones shaped by the hammer (in default of suitable stones at hand) are placed in every interstice of the larger stones; so that very little mortar is intermixed in the body of the wall, which is raised stage by stage of convenient height; the outside of spauled masonry especially presenting an almost uninterrupted surface of stone, supplementary splinters being carefully inserted in the joints of the undried wall.

The seemingly rude coverings of these towers are perhaps the best, that is, the most durable, ever devised by human wit. The arch familiar to the Greeks of the lower empire, could not be introduced where lateral abutment was impossible, and timber support was out of the question, so that the overlapping of flat stones consolidated by mortar into a hollow cone, was perhaps the only resource; and a few of these stone roofs still remain surmounted by their cap-stone. A civil engineer, connected with Mr. Telford's occasional missions to Ireland, has remarked, that the four windows (or narrow loop-holes), of these towers near the summit, accord with the four points of the compass; but some of the towers have only two such windows; while others have more than four.

We come now to notice the operations of Mr. Telford to which we before alluded.

This distinguished engineer had seen evidence of the weakness of masonry supports, which in appearance promised the utmost durability. The fall of St. Chad's Church, Shrewsbury (1788), disclosed to him the structure of its pillars. These were of great diameter, but were mere shells of masonry filled up with dry rubbish; nor indeed is such dangerous fallacy confined to ancient edifices: the rubble backing of the piers of Westminster Bridge (finished in the year 1745), scarcely supports itself whenever the surface of ashler-work is removed for occasional repairs. Mr. Telford led the way in preventing much of this kind of fraud in bridge-building, by substituting longitudinal walls under the road-way, instead of filling the space with earth or rubbish, a great improvement which has since been adopted by all engineers. And whenever masonry piers are of sufficient dimensions to admit of apertures large enough for the workman, and also admitting of an examination of his work, security is thus obtained, far more valuable than the questionable superiority of a solid mass, in which the true bearing and connexion of every stone as in a bonded wall, is not of necessity brought to a test.

I BREAKFASTED at the fort with Lieutenant Dalgetty, (says Holman, the blind traveller,)—part of which meal we were nearly deprived of by a crow that flew in at the window; but it was fortunately saved by the timely entrance of a servant. These birds are so audacious that all persons who desire to be secure from their marauding incursions must be very careful neither to leave doors nor windows open unwatched. When the natives are carrying home baskets of provisions on their heads, they are frequently attacked by a flock of these voracious birds, who pounce upon the contents; nor will they desist from the work of spoliation until the basket is set down, and they are literally driven from it by force of arms. The bold thieves plunder children still more mercilessly, actually snatching the food from their hands; and it is amusing to witness the art they use to dispossess a dog of a bone. No sooner has the animal laid himself down to enjoy his meal at leisure, than a predatory covey descend and hover over him. One more daring than the rest then alights beside him with the most unwelcome familiarity. The dog, startled and annoyed, suspends his labours, and growls out his displeasure, but in vain. The crow advances with the self-possession of an invited guest; until at last the exasperated owner of the prize lets fall his bone, shows his teeth, and makes an indignant snap at the pertinacious intruder, who dexterously eludes the bite which he has so cunningly provoked, while at the instant the dog's attention is diverted, another crow, who has been vigilantly watching the opportunity, seizes the coveted treasure, and bears it off in triumph.

SOME ADDITIONAL NOTICES ON THE SUBJECT OF GUNPOWDER.

THE following details respecting the nature and properties of Gunpowder, which, for want of space, were mitted in the last month's Supplement, will be found nteresting.

There are some phenomena presented by the natural roduction of nitre, which we are unwilling to pass over ithout a slight notice, especially as they have been a ource of much surprise and speculation: we mean the rowth and accumulation of nitre on walls that contain nuch lime, either in the stone with which they are built, or n the mortar used as a cement to the stones. Perhaps we annot better employ the short space which we can spare or this subject, than by giving a few details of experiments ctually performed to elucidate the phenomena.

In 1814 Dr. Kidd, at that time Professor of Chemistry in the University of Oxford, read a paper before the Royal Society of London, on the accumulation of nitre on the walls of the laboratory of that university. He prefaced his remarks by a description of the building. The Ashmolean Museum of Oxford was built by Sir Christopher Wren, and is formed entirely of calcareous free-stone. The laboratory occupies the lowest story of the building,—its floor being nine feet below the level of the street. Three out of the four walls of the room are in contact with the external ground, but the fourth, or south side, is open to a court-yard or area. The walls are three feet thick, and on that side farthest from the court-yard, nitre is constantly effloresceing from the substance of the stone. Its general consistency is that of very fine grains or crystals, which, taken collectively, have the appearance of down.

Dr. Kidd had frequently remarked its appearance, but in the winter of 1812 he began to notice it more regularly. He selected a particular spot, and brushed the whole of the efflorescence carefully away. In three days' time it again appeared; but gradually diminished for eight days, without any adequate external cause for its disappearance. This occurred at the end of January, and no new deposit appeared until the 16th of March, when an abundant supply effloresced in two days. Dr. Kidd remarked that the weather was frosty at the end of January, and at about the 16th of March, but milder between those periods—a circumstance worthy of notice. It was again removed, and again reformed by the 4th of April—the latter part of the time being cold. The surface of the wall was then thoroughly *scraped*, to give a new surface to the stone; but in thirteen days, the nitre formed on the new surface attained a maximum in quantity, and again diminished. A portion of the wall was wainscoted and then painted; but the nitre penetrated through both wood and paint, and appeared at the surface of the latter, which became loosened from the wood. On another spot a glass plate, about a foot square, was fixed parallel with the wall, at a distance of one-third of an inch from it, the edges being made air-tight by cement: the glass was then covered with a whitewash of prepared chalk and distilled water; but, although it was in the winter season, not a particle of nitre appeared on the outside for forty-one days that it was kept in that state. On removing the glass plate, the portion of wall behind it had a small quantity of nitre on it, but distinguished from any before seen by being in much larger crystals. The shortest time in which nitre formed after being brushed off, Dr. Kidd found to be four hours. The most general results appeared to be, that the formation was more rapid in winter than in summer, and that in summer light appeared to favour, but in winter to retard, the formation.

We may remark, that such of our readers as may have opportunities, would render service to science by making observations on these remarkable formations; Nitre is resolvable into oxygen, hydrogen, nitrogen, and potassium; and from what source the last substance can emanate is a matter of much speculation and theory.

A result which would be little expected by most persons, has been stated as having followed the pressure of a ramrod against the charge in a gun-barrel at the moment of firing. The account is translated into the Journal of the Royal Institution for 1831, from a foreign journal, and is in these words. "At the sitting of the Helvetic Society of Natural Sciences, of the 28th of July last, a letter was read from Dr. Flachin, of Yverdun, relating to an experiment before mentioned to the society, in which the ball was prevented from leaving the bottom of the musquet when the gunpowder was fired, simply by putting the ramrod upon the ball, and the end of the finger upon the ramrod. He supposes that the effect may be explained by the circumstance that near the charge the ball has a very small velocity compared to that impressed upon it by the expansive force of the gases from the fired gunpowder when exerted during the whole of the time in which it is passing along the barrel. It is well known that the effect thus accumulated is the reason why long pieces carry further than short ones, and why the breath of a man, which cannot exert a pressure of more than a quarter of an atmosphere, may, by means of a tube, throw a ball to the distance of sixty steps. The experiment above requires great care, especially as to the strength of the piece, which is very likely to be burst in the performance of the experiment."

In order to prove the necessity for the actual contact of flame, in order to explode gunpowder, the following experiment has been devised, and often performed by the writer. Take a narrow cork, about one inch in diameter, and round its circumference fold loosely several turns of lamp-cotton: place this in a little dish, somewhat larger than the diameter of the cork and cotton, and pour some spirit into the dish. Then place on the centre of the cork a conical heap of gunpowder—about a small thimble-full. Ignite the spirit in the dish, and the resulting flame will also be conical, entirely surrounding the cork and gunpowder; and the latter will be in no wise affected: it will remain for ten or fifteen minutes, provided there be sufficient spirit to burn during that time, and the powder will not be ignited; but if the flame be blown on one side, so as to bring it in contact with the powder, the latter will ignite almost immediately. Now the reason of this is to be found in the fact that flame is *hollow*: it has been appropriately called a luminous bubble filled with inflammable gas; but the gas can only inflame on the outside where it is in contact with the oxygen of the atmosphere, which is indispensable in all the ordinary instances of combustion.

There is also another experiment (familiar to the scientific lecturer) which shows the necessity of the presence of the air in order to explode gunpowder. A piece of iron is made red-hot, and placed on a metal stand upon the table of an air-pump. This is covered with a glass receiver, in the top of which is inserted a convenient apparatus for allowing gunpowder to fall down upon the incandescent iron. The air is exhausted, and the powder, falling upon the iron, is simply burned with a blue waving flame; but no detonation whatever results. The writer has often performed this experiment, and another equally striking:—A gun-lock, cocked and charged with powder, is placed under the receiver of an air-pump; the air is removed, and the gun-lock fired, but no action takes place on the powder. But when the air is re-admitted, and the gun-lock re-cocked and fired, the explosion of the powder takes place in the usual manner.

THE secret of rendering docile, and handling with impunity, the most venomous serpents, which has so long been in the possession of the natives of Western India, is not unknown in China. It is observed that the native snake-catchers here rub their hands, previous to taking hold of the snake, with an antidote, composed of pounded herbs. The virtue of the preparation is such that they hold with the naked hand, and provoke fearlessly, the deadly cobra di capello, or spectacle viper, which, next to the rattlesnake, is perhaps one of the most dangerous reptiles in existence. This serpent, in common with others of a similar nature, is not unfrequently met with in Canton, in the possession of those men, who, for a trifling gratuity, exhibit them to the curious spectator.—?

THE agility and strength of insects are well known. Ants can carry loads forty or fifty times heavier than themselves. Linnæus has calculated that the Melolontha is, relatively to its size, six times stronger than the horse; and he asserts if the proportional strength of the Lucanus, or stag-beetle, had been given to the elephant, it could have torn up the largest trees by the roots, and, like the giants of mythology, could have hurled huge rocks against its assailants.

RELIGION is that hope which is the resource and the comfort of the patient, and the sovereign balm for all the evils of life!—ANON.

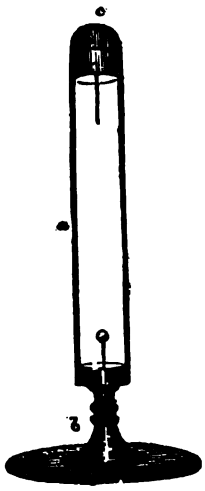
ELECTRICITY.

No. VII.

ELECTRICAL EXPERIMENTS.

ELECTRICITY moves with greater facility in rarefied air than in that of ordinary density, the spark diffusing itself and losing its characteristic brilliancy in proportion as the medium through which it is transmitted becomes more attenuated. This fact is strictly in accordance with our previous knowledge of the non-conducting properties of air, and would seem to imply, that, in a perfect vacuum, the motion of electricity must be the same as it is in good conductors.

Let *a* represent a strong glass tube, about eighteen inches long, and two inches in diameter, fitting air-tight at each end into brass caps, and supported by a stand *b*. The spherical portion of the cap *c* unscrews, and underneath it is an air-valve, opening outwards, to which can be attached a syringe, for the purpose of withdrawing air from the tube. A pointed wire at one end, and a brass ball at the other, project within the tube, to prevent the electricity from passing along its sides.



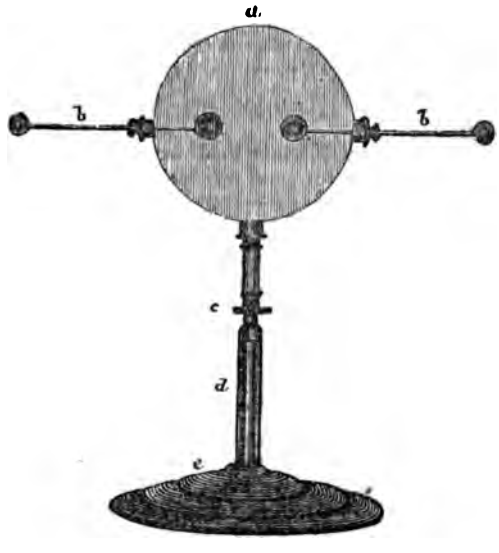
When the tube is in its ordinary state, if the cap *c* be placed near the conductor, and the machine set in motion, only a few feeble sparks will enter the tube, the remainder of the electricity making its escape externally.

Let the syringe be now fixed to the air-valve, and after working it, say ten or fifteen strokes, on presenting the tube to the conductor, in the same manner as before, the electricity will be seen to pass freely through it, and, by a little management on the part of the operator, it can be made to exhibit distinct and uninterrupted streams of violet-coloured light, which extend the whole length of the tube.

Again applying the syringe, and exhausting as much air as possible from the tube, if it be brought near the conductor, it will be found that a very small quantity of electricity will be sufficient to illuminate it; and in a darkened room it will appear to be filled with a lambent flame, the colours of which are changing every moment through all the varied hues of the rainbow.

Here is another form of apparatus for illustrating the effects of electricity, when transmitted through air or other gaseous bodies of variable densities:—*a* is a globular glass vessel, about nine inches in diameter, at opposite sides of which are brass rods, *b b*, sliding in air-tight collars, and terminating in balls of the same kind of metal. At *c* is a stop-cock, by which the globe is detached from its support *d e*, and connected with a syringe, or the plate of an air-pump, for the purpose of exhausting it of air: *d* is a glass pillar, and by its means the apparatus is insulated. In using it, therefore, it is necessary that one of the sliding rods should communicate with the floor by a wire or chain; the other being placed at any required striking distance from the conductor.

Proceeding as above directed with the luminous tube, we ought first to notice the effect of the electric spark in the globe when the latter is filled with air, and which will be precisely similar to that produced between two brass balls at the same distances, under ordinary circumstances. In proportion, however, as the air is withdrawn from the globe, it will be found that the space between the balls may be increased; and when the exhaustion is carried to its utmost possible limit, electricity of such feeble tension as scarcely to penetrate a column of air of half an inch in thickness, will pass with the utmost celerity entirely across the globe, filling its whole area with streams of light, the colours of which are so beautiful, their forms so various, and their movements so rapid, as fully to justify the general opinion, that this species of electric light is identical with that which constitutes the magnificent meteor called the Aurora Borealis.



It was noticed long ago, that the Aurora was, in some way or other, connected with magnetism. During the last few years it has been ascertained, that magnetism and electricity are so closely allied, that it is difficult, if not impossible, to assign to either its exact limits, or to determine, in any particular class of phenomena, where the one operates independently of the other

Returning for a moment to the exhausted globe, let us mention, that if it were possible to produce within it a perfect vacuum, that is, a space wholly void of air or vapour, we have reason to believe that electricity would pass through it without exhibiting any luminosity, something analogous to this having been observed in the nearest approach to a vacuum hitherto attained.

It is also deserving of remark, that in the experiments we have just been describing, whether a tube or a globular vessel be employed, the space through which the electric spark can be transmitted, its colour, and the forms it assumes, depend solely on the density of the air. Hence we conclude, that the Aurora consists of diffused electricity passing from one part of the atmosphere to another, or, in some instances perhaps, from the earth to the atmosphere; the colours and other appearances presented by it being determined by distance, by the position of the observer, by the density, temperature, and hygrometrical state of the air, and most likely by other conditions which are only imperfectly understood.

The energy of the electric spark, next demands notice; and by that, we mean its power of communicating heat to certain substances, of igniting others, and, in an accumulated form, of dissolving metals and causing the disruption of the hardest minerals.

If a person stand on an electrical stool, (which is a stool with strong glass legs), and be in communication with the conductor, on exciting the machine,

the person thus situated will be charged with electricity; and if we present the knuckle, or a brass ball, to any part of his body, sparks will issue from it precisely in the same manner as they do from the conductor itself; but the colour of the sparks will not be so intensely white, as when taken from a metallic substance.

In this experiment the individual electrified is said to be *insulated,* the glass pillars which support him preventing the escape of electricity to the earth. This will be seen in a moment, if he touch any person or object not insulated; as in that case no sparks will be emitted from his body, the electricity passing off silently and unobserved to the floor.

The electrical stool must be wiped carefully before it is used; and we find it useful to place a large sheet of brown paper, thoroughly dried, underneath it, the more effectually to protect the legs from dust or moisture.

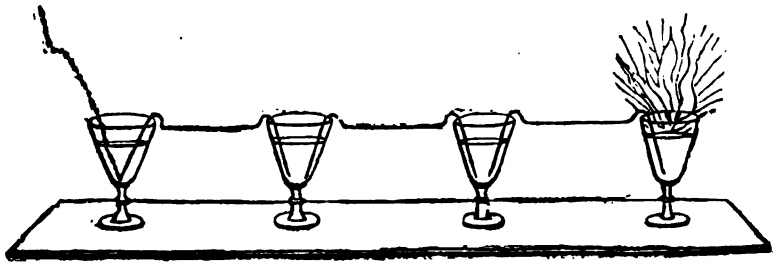
When a person is electrified in the manner just described, no painful, nor indeed, unpleasant sensations are experienced, excepting when another person or object approaches sufficiently near to receive the spark; that being accompanied by a sharp pricking at the surface of the body, and a vibratory, or rather convulsive motion of the muscles, varying in its intensity according to the length of the spark, the part from which it issues, and the nature of the materials of which the dress is composed. On these occasions the hair of the individual is more or less affected, the cause of which has been already explained*, and when it is long, dry, and of a fine texture, presents a very extraordinary appearance.

Let us now suppose a person to be standing on an electrical stool, as already mentioned. If another person take a table-spoon, the bowl of which, having been previously warmed, contains a small quantity of spirit of wine: on placing the surface of the spirit within about an inch of the top of one of the fingers (which must be pointed downwards) of the person on the stool, sparks will pass from the finger to the spoon, and in their transit will inflame the spirit. The same result will follow if the person electrified hold the spoon, whilst another receives the spark through the spirit on his knuckle, or by means of a brass ball.

This experiment can be pleasingly varied as follows:—Let four or more ale-glasses about three parts filled with cold water be placed, say, a foot distant from each other; a communication being made between them by separate wires, bent in the form as represented in the subjoined figure. The first glass must be connected with the machine by a chain, one end of which is attached to the conductor, and the other placed within the glass. On the surface of the water in the fourth glass, must be poured about a table-spoonful of ether. The machine being now set in motion, if a small brass ball be held just above the surface of the ether, sparks will pass through it from the water, and the ether will be instantly inflamed. In arranging the wires in the glasses, their points should not be in contact; as the electric energy will thereby appear the more remarkable; the ether being inflamed after the spark has passed through a column of water in each of the four glasses.

In this case, as in that also of spirit of wine, it is the vapour immediately above its surface which is first inflamed, and by that ignition is communicated to the liquid. Hence the necessity for warming the spoon containing spirit of wine, as that does not evaporate so rapidly as ether.

* See *Saturday Magazine*, Vol. XIII., p. 228.



STORMS OF SAND.

The great *Sahara Region* of Africa is a vast desert of sand, which is composed of particles of white and gray quartz, very small, and seldom attaining so large a size as to form gravel or pebbles. It is by far the dreariest region on the whole face of the globe, and the wind frequently raises this sand in clouds so dense as to overpower a whole company of travellers. "The sand-storm we had the misfortune to encounter," says Denham, "in crossing the desert, gave us a pretty correct idea of its dreadful effects. The wind raised the fine sand with which the extensive desert was covered, so as to fill the atmosphere, and render the immense space before us impenetrable but for a few. The sun and clouds were entirely obscured, and a suffocating and oppressive weight accompanied the flakes and masses of sand, which I had almost said we had to penetrate at every step. At times we almost lost sight of the camels, though only a few yards before us. The horses hung their tongues out of their mouths and refused to face the clouds of sand. A parching thirst oppressed us, which nothing alleviated."

When whirlwinds visit this immense desert, the sand is raised into pillars, a vivid description of which has been left us by the traveller Bruce. "At one o'clock," says he, "we alighted among some acacia trees at Wady el Halboub, having gone twenty-one miles. We were here at once surprised and terrified by a sight surely one of the most magnificent in the world. In the vast expanse of desert from west to north-west of us, we saw a number of prodigious pillars of sand at different distances, at times moving with great velocity, at others stalking on with majestic slowness. At intervals we thought they were coming in a very few minutes to overwhelm us, and small quantities of sand actually more than once reached us; again they would retreat, so as to be almost out of sight, their tops reaching to the very clouds; then the tops often separated from the bodies, and these, once disjoined, dispersed in the air, and did not meet more; sometimes they were broken in the middle as if they were struck with a large cannon shot. At noon they advanced with considerable swiftness upon us, the wind being very strong north. Eleven ranged along side of us, at about the distance of three miles; the greatest diameter of the larger appeared to me, at that distance, as if it would measure ten feet: they retired from us with a wind at south-east, leaving an impression on my mind to which I can give no name, though surely one ingredient was fear, with a considerable degree of wonder and astonishment. It was vain to think of flying: the swiftest horse would be of no use to carry us out of this danger, and the full conviction of this riveted me to the spot."

Adanson, in crossing the river Gambia from the Great Desert, observed one of these pillars of sand crossing that river. It passed within eighteen or twenty fathoms of the stern of the vessel, and seemed to measure ten or twelve feet in circumference, and about two hundred and fifty feet in height. Its heat was sensibly felt at the distance of a hundred feet, and it left a strong sulphureous smell behind it.—?

WRITING MATERIALS.

No X. On Wafers.

Respecting the antiquity of wafers Mr. Spiess of Halle has remarked that the oldest seal with a red wafer appears to be on a letter written by Dr. Krapf of Spiess, in the year 1624, to the government of Bayreuth. Spiess also discovered that some few years after the last-mentioned date, the Brandenburg factor at Nuremburg, whose name was Forstenhausser, sent wafers, similar to the one just alluded to, to a bailiff at Osternohe. It appears, however, that wafers were not used, during the whole of the seventeenth century, in the chancery of Brandenberg, but only by private individuals, and even by these to a very limited extent; the reason being, as was observed by Spiess, that writers preferred the (so called) Spanish wax to wafers. The first wafers with which the chancery of Bayreuth began to seal their documents, were, according to the details of an expense-book of the year 1705, sent from Nuremburg. The employment of wax, however, still continued, and in the archives of Plassenburg there is a rescript, written in the year 1722, and sealed with the proper sealing-wax. The exclusive use of wax must have continued to a still later period in the duchy of Weimar; for in the *Electra juris publici* there is an order of the year 1716, by which the introduction of wafers in law matters was forbidden, and the use of wax enforced. This order was abolished by order of Duke Ernest Augustus, in 1741, and wafers were again introduced.

The invention of wafers is attributed to the Genoese. The date of the introduction of wafers into England does not appear.

The adhesive property of common paste belongs to *gluten*, one of the ingredients of most of the esculent seeds, especially wheat. In the manufacture of wafers, fine wheaten flour is employed: this is formed into a smooth paste, with two other adhesive ingredients, viz. white of egg and isinglass. This paste is spread evenly over six plates, with a certain pressure, and dried in an oven, or at a peculiarly shaped stove. Several of these tin plates are piled upon each other, and the contact of the heated metal with the sheet of paste communicates to it a smooth glossy surface. When the drying is complete, the sheets of paste are placed upon each other to the thickness of an inch or so, and then cut into wafers of various sizes by means of hollow punches. The wafers being allowed to pass up the hollow cavity, they merge at an opening which is formed for that purpose at the side of each punch. The various colours which we are accustomed to meet with in wafers are communicated to them by the usual colouring materials, such as red-lead, vermilion, smalt, &c., which are mixed up with the paste, previous to the process of drying. Some of these colours being poisonous, the wafer-maker sells the refuse coloured clippings for the purpose of destroying rats and other vermin.

A very elegant form of wafers, called *medallion wafers*, was invented some years ago. The surface of each wafer represents in relief many of those classical and antique devices which we are accustomed to see in ordinary seals, but the effect is more pleasing than in the latter. Medallion wafers are thus prepared:—A given quantity of very pure glue is dissolved in water, to which a coloured tint has been imparted by turmeric, brazil-wood, or some other dye. A gem, seal, or medallion, is then moistened with a weak solution of gum, in which an opaque, white, or other material has been dissolved: this coloured gum-water is then carefully wiped off the plane projecting parts of the seal, and allowed to remain only in the hollows or other depressions. A small quantity of the coloured glue, in a melted state, is poured over the seal, and the whole is dried by a gentle heat. In drying, the glue and gum shrink, and thus become easily separable from the seal. Matters are so arranged that the medallion wafer shall present a thickness not exceeding that of common writing-paper, and it then yields a beautiful copy of the seal; the coloured gum giving the device, and the glue the ground; and when the respective colours are well chosen, the whole appearance of the wafer is chaste and harmonious. It will readily be supposed that so elegant a wafer is not intended to be hidden by being placed between the folds of a letter: it is, on the contrary, used much in the same way as a common seal of sealing-wax, so far as its position is concerned. The part of the paper to which it is to be applied is wetted slightly, and the back surface of the wafer is placed on the wetted part, to which it immediately adheres, in consequence of the glutinous nature of its ingredients. The process of forming these wafers amounts, in fact, to forming a mould of any seal, intaglio, &c., and with certain variations, this process has long been in use for taking impressions from ancient coins, &c. The application of the process to the making of wafers is, however, the novelty of the invention.

There is a kind of wafer, called *French isinglass wafer*, prepared in the following manner. Isinglass is dissolved in water to a proper consistence, and is poured upon glass plates with raised borders; these plates have previously been rubbed over with ox-gall, to prevent the adhesion of the isinglass. Various colouring materials, and frequently perfumes of various kinds, are mixed with the isinglass in a fluid state, and before the film on the plate is quite dry, it is cut along the edges, and separated from the plate. It is then cut into wafers in the usual manner. These wafers are exceedingly thin, and are far more adhesive than the common wafers: they also require less wetting to make them adhere. These wafers were sold some years ago in London, in the neighbourhood of Wood-street, Cheapside, at a wafer-maker's. They were called "Patent Wafers," and were sold in sixpenny packets, each containing 150 or 200 wafers.

DANCE OF THE DERVISHES.

In a mosque at Tophana was exhibited the Dance of the Dervishes; a ceremony so extraordinary, that it is necessary to see it, in order to believe that it is really practised by human beings, as an act of devotion.

As we entered the mosque, we observed twelve or fourteen Dervishes walking slowly round, before a superior, in a small space surrounded with rails, beneath the dome of the building. Several spectators were stationed on the outside of the railing; and being, as usual, ordered to take off our shoes, we joined the party. In a gallery over the entrance were stationed two or three performers on the tambourine and Turkish pipes. Presently the Dervishes, crossing their arms over their breasts, and with each of their hands grasping their shoulders, began obeisance to the Superior, who stood with his back against the wall, facing the door of the mosque. Then each in succession, as he passed the Superior, having finished his bow, began to turn round, first slowly, but afterwards with such velocity that his long garments, flying out in the rotary motion, the whole party appeared spinning like so many umbrellas upon their handles. As they began, their hands were disengaged

from their shoulders, and raised gradually above their heads. At length, as the velocity of the whirl increased, they were all seen, with their arms extended horizontally, and their eyes closed, turning with inconceivable rapidity. The music, accompanied by voices, served to animate them; while a steady old fellow, in a green pelisse, continued to walk among them, with a fixed countenance, and expressing as much care and watchfulness as if his life would expire with the slightest failure in the ceremony.

I noticed a method they all observed in the exhibition; it was that of turning one of their feet, with the toes as much inward as possible, at every whirl of the body, while the other foot kept its natural position. The elder of these Dervishes appeared to me to perform the task with so little labour or exertion, that, although their bodies were in violent agitation, their countenances resembled those of persons in an easy sleep. The younger part of the dancers moved with no less velocity than the others; but it seemed in them a less mechanical operation. This extraordinary exercise continued for the space of fifteen minutes; a length of time, it might be supposed, sufficient to exhaust life itself during such an exertion; and our eyes began to ache with the sight of so many objects all turning one way.

Suddenly, on a signal given by the directors of the dance, unobserved by the spectators, the Dervishes all stopped at the same instant, like the wheels of a machine; and what is more extraordinary, all in one circle, with their faces invariably towards the centre, crossing their arms on their breasts, and grasping their shoulders as before, bowing together with the utmost regularity, at the same instant, almost to the ground. We regarded them with astonishment, not one of them being in the slightest degree out of breath, heated, or having his countenance at all changed. After this they began to walk, as at first; each following the other within the railing, and passing the Superior as before. As soon as their obeisance had been made, they began to turn again. This exhibition lasted as long as the first, and was similarly concluded. They then began to turn for the third time; and as the dance lengthened, the music grew louder and more animating. Perspiration became evident on the features of the Dervishes; the extended garments of some among them began to droop, and little accidents occurred, such as their striking against each other: they nevertheless persevered, until large drops of sweat falling from their bodies upon the floor, such a degree of friction was thereby occasioned, that the noise of their feet rubbing the floor was heard by the spectators. Upon this, the third and last signal was made for them to halt, and the dance ended.

This extraordinary performance is considered miraculous by the Turks. By their law, every species of dancing is prohibited; and yet, in such veneration is this ceremony held, that an attempt to abolish it would excite insurrection among the people.—Dr. E. D. Clarke.

HIMYARITIC LANGUAGE.

Many of our readers will be interested with some extracts from a letter, written by Lieut. Wellsted, of the Indian Navy, and recently read before the Asiatic Society. It is on a subject of much interest, not merely to the philologist and historian, but also to those who are, by such researches, placed in a position to defend the Inspired Volume from the sneers and attacks of infidels, and to confirm the important fact, that the more thoroughly these regions are investigated, the more scrupulously correct will be found the Sacred writings. But let us hear Mr. Wellsted.

At the period of the promulgation of the Koran, two alphabets were used in Arabia—the Kufic, in which that work is written, and which we are still able to decipher, and the Himyaritic, adopted by the people of Yemen, but which, until I found it, was supposed to be lost to us. I know not, therefore, on what grounds certain philologists have conjectured it bore a strong affinity to the Ethiopic: but, when the Koran appeared in the Kufic character, the inhabitants of Yemen were unable to read it. It has frequently been a subject of regret that we were in possession of no inscriptions from the country * by which these points might be determined. Niebuhr, during his stay in Arabia, sought in vain for them. I add, that, "owing to the locality in which these inscriptions are found, and for other reasons I venture to suggest that these, together with those found at Hassan Gorab, are in the lost Himyaritic writing. Should this prove the case, the resemblance to the Ethiopic is not conjectural, since a complete identity in many of the letters can be traced."

On this subject the Geographical Society, in a review of the Ethnography of the African races, observes—"Dr. Pritchard brings arguments to prove that the Abyssinian alphabet was derived from the Himyarites, and not invented by the first Christian missionaries at Axum, as Michaelis and other biblical writers have supposed; and here we may observe, that it has been discovered by Lieutenant Wellsted that such was precisely the fact. The letters of the Abyssynians, or characters nearly resembling them, have been used of old by the Himyarites; and this discovery, anticipated from a survey of historic probabilities made by a British naval officer, has put an end to a controversy, long agitated amongst the European literati, as to the era and manner in which the Abyssinians came to be possessed of the art of writing."

Mr. Wellsted then proceeds to draw the attention of the Society to the important fact, that there is the strongest reason for believing this Himyaritic language to be still a spoken one; he gives, indeed, a few words of the language which he brought with him; and, to place the matter beyond doubt, recommends that a copious vocabulary be forthwith obtained from Arabia.

For reasons, into which he enters at some length, Lieut. Wellsted states his opinion, that a most powerful monarchy once existed in Yemen, South Arabia, which extended its limits to India, endured 2000 years, and numbered amidst its monarchs the renowned Queen of Sheba. One of these monarchs extended his conquests into Chinese Tartary; and much as the reality of this expedition has been doubted, Mr. Wellsted brings to our notice, that when the early Mohammedan conquerors took Bokhara, they found over one of its gates an inscription, in the Himyaritic character, expressly recording the visit of this monarch.

There can be little doubt, but that this character and language is one of the oldest (if not the oldest) on the face of the globe. "Writing was known to Job and to the Himyarites many centuries before Mohammed, as appears from some ancient monuments said to remain in that character."—*Universal History*. One of these "ancient monuments," therefore, it has been my good fortune to discover. Again, the same authority says, "The Himyarites were not strangers to the art of writing, the characters used by them were the most ancient of any used by the Arabs; from the mutual dependence of the letters or parts upon each other it was called *El Mosnad*." At this point, however, we have enough to pronounce, that a new Semetic language is probably before us, which may, in ancient times, have extended over Asia, and which by future researches promises to add a new version of the Bible to the

* Sir William Jones, in his annual address, more than once alludes to this desideratum; and, in a Memoir addressed by the French academicans to the King of Denmark, seventy-five years ago, it formed one of Michaelis's questions for the solution of the celebrated Danish travellers, who were about to proceed to Yemen. Michaelis appears to have been fully aware of the importance of obtaining this character and language.

collection of our Polyglott. I do not hesitate even to predict, that we have enough before us, to call seriously in question the correctness of a portion of our present system of comparative geography.

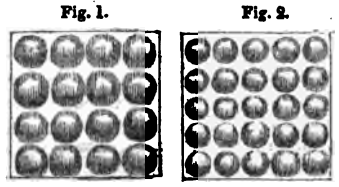
Lieut. Wellsted proceeds to pronounce his decided belief, that Yemen was the country from whence came the Queen of Sheba, to honour, in the plenitude of his wisdom and his power, the wise sovereign of Israel. He has ascertained that the country does now, and has ever since, retained that name. He throws also some curious lights on the Scriptural narrative, as to the voyage of the latter monarch, and the fleets to Tarshish and Ophir, concerning which the learned have been much divided. Lieut. Wellsted also brings to our notice a most singular and most interesting fact, that inscriptions in this ancient character have, since his discovery of those in Arabia, been found in Asia, in Africa, and even in America. But we must close our notice of this letter with Lieut. Wellsted's concluding remarks.

I have only to add, that whither the clue we have thus obtained to the decyphering of these inscriptions will lead, is a point on which I will not permit myself now to speculate; but, if we succeed, it is impossible to conceal, that we have in prospect the certainty of deciding on the existence of a mighty empire:—one of the oldest languages in the world will be presented in an open volume to us; a light will be thrown on all that space which has hitherto been wrapped in the gloom of ages. The era of letters, the migration of nations, the progress of civilization, the desolating march of eastern conquerors may be traced—while the traditions and writings of the Arabian and profane authors will not, in this and in other cases, be deemed so wholly unworthy of credence; and, at the same time, we may look forward with confidence to receiving further testimonials to the scrupulous fidelity of the sacred writings.

THE STRUCTURE OF THE BLOOD AND MUSCULAR FIBRES.

WE have already noticed, in several volumes of this Magazine, the wonderful discoveries which are due to the invention of the microscope; but the wonders it has developed are almost innumerable, all tending to exhibit in various aspects, the continued beneficence of the Creator, for the comfort and well-being of his creatures. The blood, muscles, and nerves, have been subjected to examination, and the beauty of their structure has been found to be surpassingly great. The microscope teaches us that blood is composed of a number of red globules floating in a colourless liquid; these red globules are so minute that the space of a superficial square inch will contain by calculation as many as 2,890,000; but when deprived of their colouring matter, which appears not to be contained in their substance, but merely to cover their surface, the same space will hold as many as 4,000,000.

Fig. 1. Fig. 2.



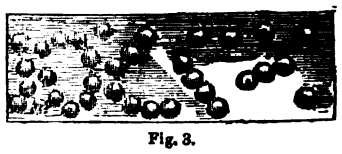


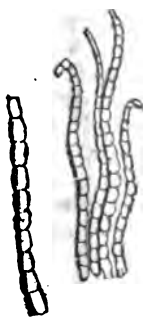
Fig. 3.

Fig. 1 shows a small square spot containing sixteen coloured globules of blood. A spot of the same size, fig. 2, will contain as many as twenty-five globules when deprived of their colouring matter

In order to obtain a good view of the globules in their coloured state, it is necessary that a very small quantity of blood only, should be smeared as thin as possible on the glass, that all moisture may instantly evaporate; they then remain of their full size and colour, perfectly spherical, as in fig. 1. If a greater quantity of blood, be laid upon a glass which retains moisture, only for the space of half a minute, the colouring matter begins, in a few seconds, to separate, and form a circle round the globule, and if the blood is diluted with water, the separation of the colouring matter is instantaneous, and the globule puts on the appearance represented in fig. 2. When the globules in the human blood lose the colouring matter, they continue floating, till they gradually appear to be attracted by each other, or to collect in groups, as in fig. 3; from this arrangement, Sir Everard Home thinks it probable that the globules are that portion of the blood from which the fibres of the muscles are formed.

He made several attempts to ascertain the construction of the muscular fibre, and at last succeeded in laying a single fibre from the thigh of a roasted chicken under the microscope. It was then found, that if the muscular fibre of a chicken, which has been boiled or roasted, be soaked in water, changing the water every day for a week, single fibres can be easily detached, and they appear as in fig. 4; and if they are still kept in water, they are broken down into numerous small globules, of the same size as those found in the blood.

Fig. 4.



In pursuing his inquiries, as to the properties of the blood, another singular phenomenon came under his notice; he observed, that if a quantity of this fluid was allowed to remain at rest for a short time, a thin film, or pellicle, was soon formed on its surface; a quantity of air was also disengaged from its substance, which, being unable to force its way through the film, formed channels under its surface, running in various directions, and having the exact appearance of empty blood-vessels. Observations of a like nature were then made on the blood, which, having flowed from a wound, had coagulated on its surface on the living body; here the same channels were made by the disengagement of air, but, instead of remaining empty, as in the first experiment, they became filled with liquid blood from the smaller veins and arteries, and becoming connected with them, formed fresh living tissue, and thus connected the parts divided by the wound.

RAMLA, an ancient town of Palestine, now in ruins, says Mr. Thompson, a missionary, who was there in May, 1834, has, at no very remote period, been much larger than at present. The number of inhabitants is perhaps six thousand, mostly Mussulmen and Greek Christians; but what is extraordinary is the fact that at least one half the population is blind, either in one or both eyes, and many of the inhabitants have such weak eyes that they keep them half closed. Ramla is situated in the centre of a vast plain in the valley of Sharon; and it is probable that the continual reflection of the sun's rays from the white sand is the cause of this universal calamity.

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ON STAINED GLASS WINDOWS. II.

STAINED GLASS WINDOW IN YORK CATHEDRAL.

We come now to notice those curious and instructive processes of the glass-stainer whereby the chief material is produced in

> Storied windows, richly dight,
> Casting a dim religious light.

When certain metallic substances are made, through the agency of heat, to combine with colourless glass, the result is a stain which penetrates more or less deeply into the very substance of the glass itself. As the choice and management of these metallic colouring matters are points of the greatest importance, we will first offer a few details on the subject. We have already described the general processes of glass-blowing*, so that by referring the reader to that article, he will the better appreciate the following details.

The colouring materials are in all cases metallic. Gold is employed for purple; a mixture of gold and silver gives a rose colour; iron, a brick red; iron, copper, and manganese, in various proportions, form browns and blacks. Perfectly black glass, in large slabs, is now imported from Russia, and is used instead of black marble in ornamental furniture.

Blue is obtained from cobalt, commonly called *zaffres*. The origin of this term is curious: the old glass-stainers preserved their processes with jealous secresy; and when urged to disclose them frequently gave false recipes †, one of which for a blue stain was *sapphires*. When oxide of cobalt became known as the real material, this was supposed to be the

* See *Saturday Magazine*, Vol. III., p. 131.

† The same practice is still adopted, and the "valuable recipes" for enamel colours and stains contained in many of our works on the subject, are almost worthless. M. Brongniart well observes, "It is very remarkable that if the processes described in these works were strictly followed, it would never be possible to form the colours for which those recipes are given."

sapphires of the old stainers; and by an easy corruption, it was called zaffres, under which name it is now commonly known in commerce.

Pure silver possesses the extraordinary property of staining glass *yellow* when brought in contact with it at a dull red heat, and this is the material employed for yellow, orange, or red stains; any one being produced by modifications of the same process. No flux is used; but the silver is ground with ochre or clay, and laid in a thick stratum on the glass. After the process of firing, although the silver is not found to adhere at all to the glass, yet a transparent yellow stain is imparted to it. If a large proportion of ochre be used, the stain is yellow: if the proportion be small, it is orange; and by repeated firings the latter is, in some unaccountable way, converted into ruby red; and this is the process we before alluded to for procuring this colour, although it is not equal to that of the old artists.

In enamel painting, copper yields a fine green, but it does not answer well on glass; and no other material being known to afford a good green, an ingenious contrivance is adopted. Since a mixture of yellow and blue produces green, the glass, which in other cases is stained on one side only, is in this case stained blue on one side, and then, by a second process, yellow or lemon colour on the other.

In addition to the above modes of staining glass, another mode is resorted to, when practicable. It consists in melting common glass, or its ingredients, mixed with the colouring matter, in a melting pot, in the same way that ordinary glass is made. Here the resulting panes are coloured throughout their substance, and such glass is called *pot metal*.

Another mode consists in *flashing*; that is, uniting a thin layer of coloured glass with another layer which is colourless. The coloured layer is sometimes included *between two layers* of colourless glass. Such glass is prepared thus: the glass-blower has two melting-pots in the furnace, one containing colourless and the other coloured glass, each in a melted state. He dips his rod first into the colourless glass, and then into the coloured, a portion of which adheres to the lump first taken up. If it is desired to enclose the coloured film between two colourless layers, he again dips his rod into the colourless glass. He then proceeds with the processes of *blowing* and *whirling*, as in the manufacture of the ordinary crown glass for windows. We have seen some specimens of fine ruby-glass made in France by this method, which is also employed in the formation of perfume-bottles, and other ornamental vessels of particular colours.

The production of the ruby red stain has long been a most interesting feature connected with the details of our subject. We will therefore conclude this short article with a few anecdotal remarks thereon.

Gold, copper, and silver, are the reputed sources of the splendid reds of the old stainers; and so general at one time was the notion, in France, that gold was the colouring material, that in 1793, the French government actually collected a large quantity of fine old red glass, and demolished it for the purpose of getting the gold which, as it was supposed, afforded the colouring material. It is needless to remark that they were not very successful, although it was stated, by Kunckel, that gold melted with *flint* glass afforded a fine ruby colour; but as Kunckel was a stainer by profession, and derived much profit from his ruby glass, which was really fine, there is no wonder that he did not publish his process.

When gold is employed, great care and experimental knowledge is necessary, especially as to temperature; since a slight excess of heat produces a dull blue, or a dingy brown, instead of a red. A similar remark applies when copper is the material. When taken out of the melting-pot, it often exhibits only a faint greenish tinge: it is then worked into panes, by the exposure of which to a gentle heat a brilliant red is produced: this is an extraordinary and unaccountable fact.

That copper will produce a red stain was discovered (perhaps we may say *re-discovered*) in a remarkable manner. The reader is probably aware that Plate-Glass is formed by rolling out the refined glass, in a molten state, upon a steel table. The transfer of the glass is sometimes made by tilting the melting-pot over the table, and at other times by lading it out by means of a copper ladle, which must occasionally be dipped into cold water, to prevent it from being warped, or perhaps melted, by the heat. Many years ago, at the plate-glass works of St. Gobain, the latter mode of manufacture was adopted; and on one occasion, the cold-water precaution being neglected, the ladle remained in the melting pot. The workman foolishly thought that he should find his ladle at the bottom of the melting pot: the casting was proceeded with, and all the contents of the pot exhausted, but the ladle had disappeared. No further notice was taken of the circumstance, till the glass having been annealed and being about to be polished, the workmen, to their surprise, discovered traces of the lost ladle in metallic particles of copper embedded in the glass, together with large streaks of a fine red colour. This circumstance becoming known, a variety of experiments were tried by different chemists and glass-stainers, with various degrees of success.

Such then is a brief account of the colours employed in the production of stained glass. We come now to notice the method of applying them when certain patterns or figures are required, as in the case of a church window; but for the sake of greater simplicity we will show the mode of producing a small ornament, such as a *rosette*, on a pane of colourless glass.

A pattern or drawing of the desired figure is prepared, the outlines of which are dark and well defined. This is attached to the glass by means of wafers at the corners; the glass serving the same object as the glass of a picture-frame, the design being perfectly visible through it.

The colouring materials are ground up with flint glass, lead, and borax, the ingredients of a very fusible glass, which acts as a flux. Fluidity is given to the colouring matter and flux, by mixing them with a volatile oil, such as turpentine: amber oil, capivi balsam, or gum water, are also employed.

The pane of glass, with its pattern attached, is mounted upon an easel, and the figure is painted on the glass with the above colours, by means of long haired sable pencils. A rest stick is also employed, and the general process resembles that employed in painting on canvass.

When the same figure is to be produced upon a number of similar panes of glass, the pattern need not be shifted from the first pane; but the second piece of glass being laid upon the first, the process is repeated as before.

For the production of more elaborate figures, such as the full-length portrait of a man, including a portion of the building in which he is placed, two methods are united to attain the desired result. The face and other parts are painted on a piece of glass of the desired form; but the drapery &c. are cut out from pieces of glass, to which various but equable stains have been previously imparted. These irregu-

lar pieces are built up into a picture, the joints being made with glaziers' lead, care being taken to throw such joints into the shaded parts of the picture.

The sheets of coloured glass are prepared by a process similar to the blowing and whirling as adopted by the ordinary glass-blower, in the production of common window-glass: but for certain stains, and for all designs which have been painted on panes of glass, a method of fixing the colours, by burning, is adopted. The process of burning need not be described very minutely. A slight notice thereof will be sufficient for the general reader. The panes of glass are taken separately, and placed in a box of iron-plate, called a *muffle*. This muffle is furnished with shelves of iron-plate, covered with powdered lime, to prevent the glass coming in contact with the hot metal surface. The muffle is now placed within a furnace, and the contents are gradually brought to a dull red heat, by means of fuel that does not produce *flame*; for which purpose coke and charcoal are usually employed. The heat produced must be exactly sufficient to fuse the flux, by which means the colouring material becomes firmly united to one surface (the upper one) of the panes of glass. Hollow tubes pass out from the furnace into the air, through which the process of burning in the colours can be witnessed; and it requires the watchful eye of experience to detect the precise moment when the process is complete. The fire is then damped and allowed to go out gradually; and in ten or twelve hours (the glass slowly cooling and annealing all the while), the burning process is completed.

When the glass is removed from the muffle, the colours are scraped or brushed off separately; some of the more valuable stains being reserved for repeated use, since a small fraction only of the colouring matter is absorbed by the glass.

The panes are thoroughly cleaned and separately examined. If any flaws or faults appear, the colour is again applied, and a second burning is adopted. This second burning also tends to remove spots or stains, and serves to heighten the colours.

Such then is a brief account of the processes still adopted, and which were probably adopted by the older artists in the production of stained glass. Many of the fine windows which were painted previous to the Reformation, were demolished during that eventful period. In some cases the windows were pulled down, and the glass concealed in the vaults of the holy building; and thus was it preserved from demolition. In more peaceful times the windows were restored: but it has frequently happened that the concealed glass has been forgotten; sometimes it was stolen or broken by those who were ignorant of its value. As an example of the treatment bestowed on ecclesiastic ornaments, during the time of Cromwell, we may instance the fine window over the altar-piece, in the chapel of St. Peter's College, Cambridge.

This beautiful chapel was built by subscription in 1632. Some of the embellishments with which it was decorated on its first erection were demolished or removed during the civil wars. "In 1643," say the Parliamentary Commissioners, "we went to Peterhouse, and pulled down two mighty angels, and divers other angels, the four evangelists, and Peter with his keys, on the chapel door; together with about one hundred cherubim, and many superstitious letters in gold." The beautiful painted glass, which now adorns the east window, was happily rescued from the profane hands which at that time waged war against the arts by being taken to pieces and concealed in boxes. It represents the history of our Saviour's crucifixion between the two thieves. It is said to have been copied from two different designs; one of which was painted by Rubens, for the high altar of the Recollet Church, at Antwerp; and the other, from which the groups at the sides were taken, was the composition of Lambert Lombard. A fine altar-piece, of Norway oak, is placed under the sombre but pleasing light of this rich window.

The frontispiece which illustrates the present article, is a copy of an old window in York Cathedral, the work probably of John Thornton, the terms of whose engagement we stated in our former article, p. 18.

(From a Correspondent.)

[In our first article on Stained Glass Windows, (page 18 of the present volume,) we gave a list of English glass-stainers, with a slight notice of their principal works. It appears that in this list we omitted the names of several stainers who are still exercising their profession; names which, as our correspondent remarks, are, "unfortunately for the artists, scarcely known." We are anxious to do justice to all; and while we cannot but regret the omissions complained of, it will be seen how difficult it is to avoid omissions of the names of artists whose ingenious and beautiful productions are, we regret to state, so seldom brought before the public at large.]

Muss, a skilful painter, who died in 1824. Among his principal works were the Assumption of the Virgin, after Murillo, (for Sir Thomas Baring;) the Battle of Neville's Cross at Brandspeth Castle; several windows at Eaton Hall, the seat of the Marquis of Westminster, and many others.

Miller, a painter of the present day, whose chief works are done in imitation of the ancient style.

Hoadley and Oldfield, two successful artists now living. Their works are remarkable for their minuteness, high finish, and elaborate detail. Many of their performances were lately exhibited to the public, and met with favourable notice. Among their works may be mentioned the copies of those well-known engravings of Martin, *viz.*, Belshazzar's Feast, Joshua, and Nineveh; the noted Kemble family of Harlow; Faith, Hope, and Charity, after Reynolds (a copy of these were done for Charles the Tenth of France). These artists are now engaged upon a splendid window for the Rev. Gale Townley, after Spagnoletti, of the Descent from the Cross, &c., which, it is to be hoped, will be shortly exhibited to the public, and thus prove to the world that the art of painting on glass is not lost, as many foolishly imagine.

Wilmshurst, the painter of the well-known window of the Field of Cloth of Gold, a magnificent production, which was for some time exhibited in Oxford-Street, and unfortunately fell a sacrifice to fire.

Nixon, the painter of many beautiful figures, &c.

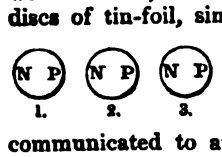
Evans, whose principal works were a window at Hornsey Church, and another at Winchester.

A pious acquaintance, remarkable for the quaint shrewdness of his observations, one day, when walking in a garden, having pulled a flower of exquisite loveliness, after expressing, in his own characteristic way, his admiration of its various beauties, took up a clod of the soil in his other hand, and naïvely, but emphatically, exclaimed, "What but Almighty power could extract that from this?" If there was anything ludicrous in the manner, there was nothing but truth and sublimity in the sentiment. Everything in the operations of the Creator is worthy of devout admiration, but I scarcely know anything in the inanimate world which brings together and concentrates so many wonders of designing wisdom and benevolence, as the structure and qualities of a flower,—and assuredly not a little is added to the surprise and pious feeling with which this delightful production is contemplated, when we think of the crude materials from which it is elaborated. The beauty of form and colour, the sweetness of the fragrance, the delicate and skilful nature of the organization, the careful provisions, the forethought, the contrivance, the suiting of parts, as regards the propagation of the species, the adaptations to the subsistence and enjoyment of the insect tribes,—all produced by the artificial union of a few simple and apparently unfit substances, cannot fail to excite in the reflecting mind, the most lively sentiments of astonishment, and to force upon it the conviction, that here, without doubt, is the finger of God.—Duncan.

ELECTRICITY.
No. VIII.
THE LEYDEN JAR.

WHENEVER the electrical equilibrium of bodies is disturbed, both kinds (or states) of electricity, are invariably brought into action. And this happens, not only, as we have on a former occasion mentioned, at different parts, or at opposite sides, of any particular substance in which a redundancy of electricity may be excited or accumulated; but its influence extends to other substances in that vicinity; although the latter be at too great a distance for any actual transference to take place. This is termed electrical *induction*; of which we shall give a brief explanation:—

To begin with one of the most simple illustrations we can select, let the figures in the margin represent discs of tin-foil, similiar to those on the spiral tube, of which a description was lately given*. It will, of course, be understood, that if these discs were in contact, and electricity communicated to any one of them, it would diffuse itself over the whole, in the same manner as if they consisted of an entire piece of metal. But the discs are not in contact; and consequently, the electricity can pass from one to the other, only by penetrating the interposed column of air; which is, indeed, the intention of their being so arranged. If, however, we examine this matter a little more attentively, we shall find that the electrical relations previously existing among these pieces of tin-foil, are affected by mere proximity to an electrified body. For example;—Let us suppose the disc marked 1, to represent that at the end of the spiral tube already referred to, and which first receives the spark from the machine. The tube being brought near the conductor, before a spark can pass from the latter to the former, the whole of the discs, whatever be the number of the series, will be *electrified by induction*; which means, that the electricity, excited and brought into action by the machine, and accumulated in the conductor, exercises an influence on surrounding objects, although no part of the redundant electricity is transferred to any of those objects. Supposing the conductor to be charged with positive electricity, the disc at the extremity of the tube, and all that succeed it, will be electrically excited in the following manner, namely, that part of the first disc, nearest to the conductor, will exhibit negative, and the part most distant positive, electricity. This is indicated by the letters N P, and is equally applicable to the series, as to any one particular disc. The instant a spark passes from the conductor to the discs, the induced electricity is dissipated; but is again renewed in the interval between the passing of each spark, although that interval be too brief either to be observed or computed.



To render this class of phenomena more intelligible, let *a* in the following figure, represent a body positively electrified, near to which are to be placed any convenient number of insulated conductors, with feathers attached to them as at *b c* and *d*, and the last, as at *e* communicating with the earth. The apparatus being thus arranged, and *a* imbued with positive electricity, *b* will instantly become negative, *c* positive, *d* negative, *e* positive, and so on throughout the whole series. This will be shown by the feathers in each case attracting each other; a result plainly indicating, that they are in opposite states of electrical excitation.

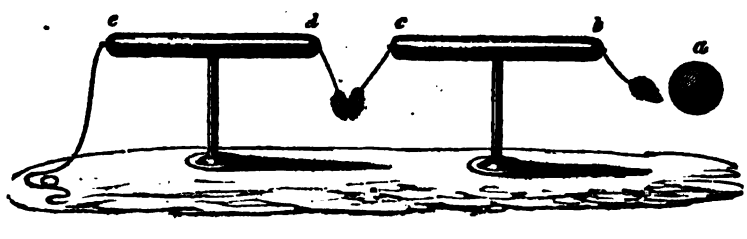
We remark further, that these experiments will be still more interesting, if to different parts of a series of insulated conductors, we attach pith-balls in pairs; by which we shall ascertain that induced electricity, is more active at opposite sides of spherical, and opposite ends of elongated conductors, than at any other parts, and that its intensity gradually diminishes towards the centre of such bodies, becoming there entirely neutral.

The effects of electricity, thus operating at a distance from the excited body, are not in any degree diminished by interposing a third body; provided however, that the latter be not liable to have its own electrical relations disturbed. A plate of glass, therefore, may be placed between two bodies acting on each other inductively, without producing any perceptible change in either.

As induced electricity acts independently of interposed bodies, its intensity, supposing all other circumstances equal, being determined by the relative sizes and distances of the exciting and the excited bodies; so must it be remembered, that its effects cease by the removal of the latter. Hence, therefore, supposing the spherical body *a* in the preceding figure, to contain a certain quantity of electricity, which operates inductively upon the insulated conductors, so long as they remain within a certain distance of *a* and of each other; on removing them, the conductors are immediately restored to their former state of neutrality, the sphere still retaining the same quantity of electricity that it did before the experiment commenced. Thus it will appear, that induced electricity, implies that no actual interchange, or transference takes place between the bodies subjected to its influence. Nothing is gained by one, or lost by the other; the only effect being the temporary disturbance, accompanied by a different arrangement, of the electricity existing in bodies, when in their ordinary and unexcited state. We could enumerate many other examples, tending to the confirmation of these views; but enough, we think, has been said, to prepare the way for understanding the principle and the method of using the *Leyden Jar*; which has been the chief design of our somewhat lengthened remarks on electrical induction.

In the instances of induced electricity just mentioned, it will be observed, that the exciting, as well as the excited bodies are conductors, and the medium through which the excitation is communicated, is an imperfect conductor; the latter consisting of the air interposed between the two former. Now although this, or any other particular arrangement, is not indispensable to the existence of the phenomena, yet it is necessary in every case that a non-conducting, or at any rate, an imperfectly-conducting substance should be present.

To illustrate this by experiment, let us take a pane of window glass, clean and dry, and if *one* side of it be rubbed briskly with a warm and dry silk handkerchief, *both* sides will become electrically excited. This may be ascertained by presenting to the side which has *not* been rubbed, a small pith-ball, suspended by a silk thread, when it will be attracted by the glass; and then if it be immediately presented to the side which *has* been rubbed, the same ball will be repelled; a proof, not only that



* See *Saturday Magazine*, Vol. XIV., p. 24.

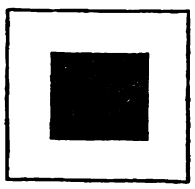
electricity is diffused over both sides of the glass, but also that the electricity on one side is positive and on the other negative.

The same results, but with greatly-increased action, will follow, if one side of the glass be held near the conductor of an electrical machine, taking care, however, whilst this is done, to pass the finger gently backwards and forwards over the other side, otherwise the glass will receive only a very feeble charge. In this case sparks will pass from one side to the other of the glass, which will have the appearance of penetrating it; they are occasioned by the sudden discharge of the accumulated electricity over the edges of, not through, the glass.

In both these experiments we have examples of electrical induction, which takes place through the substance of the glass; in the first, the side rubbed with silk is charged with positive, and the other, of course, with negative electricity; and, in the second, supposing the positive conductor to have been employed, the arrangement will be the same.

Now let us advance a step further.

Glass, it is well known, is a non-conductor, and hence it is difficult to diffuse electricity equally over every part of its surface; and, supposing that to be done, we find it just as difficult to disengage the electricity from the glass again, that is, in such a way as to serve any useful purpose. But these objects are fully attained by covering the glass on both sides with tin-foil, which must not, however, reach to within about two inches of the edges, as represented in the accompanying figure.



A pane of glass thus coated and charged with electricity, by placing one side of it near the conductor, in the manner just now directed, if we make the tin-foil on its opposite sides to communicate with each other, a sharp report is heard, accompanied by a bright spark, indicating that the accumulated electricity has been dissipated, and both sides of the glass restored to their former state of equilibrium.

Let it be particularly noticed, that the use of the tin-foil is to enable us to diffuse electricity uniformly over the surface of the glass, and having done so, to recover the whole of it again whenever we please, giving it any required direction in a condensed, or rather an accumulated form. The thin coating of metal in contact with the glass, performs only the office of a conductor; for it is possible to remove it without dissipating any of the electricity, which adheres to the glass, not to the metal.

But although a pane of glass may do for an illustrative experiment, it is difficult to manage, very liable to be broken, and capable of receiving and retaining only a feeble charge, and, therefore, not adapted for general use.

Here is a figure of the *Leyden Jar*, the most convenient form in which we can employ coated glass. It consists of a vessel, similar to those used as show-glasses by confectioners, coated on both sides, to within about four inches of the top, with tin-foil. The jar, as here drawn, has a cover of mahogany, or other hard wood, through the centre of which passes a brass rod, terminating above by a ball of the same metal, and below by a chain reaching to the bottom of the jar.

Leyden jars, fitted up as just described, are very portable, but are not the most useful; we prefer them without any cover. In our next paper we shall give instructions for constructing them on our own plan, as we shall also for performing, by their aid, some very beautiful experiments.

THE ECONOMY OF BEE-KEEPING.

Nothing gives me greater pleasure in a country walk than to hear a bee buzzing by my ear, as I pass a cottage fence. A row of bees is a sign the owner takes pleasure in his home. And a word of advice to such a man is likely to come to good.

In the first place, *Never kill your Bees.* In France, Germany, and Switzerland, they never kill their bees.

In some places they make straw hives, with the top to take off, and fasten it down with wooden pegs: in July they pull out the pegs, and with a large knife cut away the top of the hive from the comb, and cut out what honey the bees can spare, never caring for those flying about their heads; for they will not touch them if they have a pipe in their mouth. And when they have helped themselves they peg the top down again; and the bees will gather enough in August and September for the winter.

Others put a large hive on the top of a strong stock, in May, which prevents their swarming; and this hive they take off when full. Others turn up their hives in July and August, and cut out some combs. Others put wooden boxes on one another, putting empty boxes below, and taking away full ones from the top.

I saw a doctor in Switzerland take honey from twelve hives: he got fifteen pounds from each. The better way is such as is now practising by the Bee Society at Oxford.

You may find funguses, called puff-balls; when ripe they give out a powder like smoke; pick them when half ripe, (the largest are the best,) and dry them; the fungus is fit for use when it will hold fire like tinder. Keep them till you take your bees.

In autumn weigh your hives—mark those which are the heaviest and lightest; this you cannot rightly do unless you weigh them before you put your swarms in, and mark the weight outside. Casts, except they are very early and strong, will scarcely stand the winter.

When the honey season is over, stop up over night those you mean to take up. In the morning take a piece of the fungus, twice as big as a hen's egg; put it in a stick, split at one end and sharp at the other: have a hive as large as that you mean to take up, fixed bottom upwards, (a pail will hold it well). Then light your fungus, and fix the sharp end in the hive you have turned topsy-turvy, and place the hive you intend to take on the top of it, and tie a wet cloth round the two hives, that no smoke may get out. You will soon hear the bees drop down: and tap the top of the full hive to make the bees fall quicker. When they are all quiet, lift the full hive off, and turn all the bees that have fallen on a table, and they will get well again in twenty minutes. Look for the Queen Bee, keep her safe, and sweep all the other bees back into the empty hive; then cut the combs out carefully, and if you have not already found the Queen, it is likely that you will find her at the top of the hive.

Sweep the bees with a feather back into the hive out of which you have taken the combs.

As soon as the bees begin to crawl about, take a hive which is strong enough to stand the winter, or though heavy, weak in bees; stop it up the night before, and put it gently on the empty hive where the smoked one stood before, keeping the bees asunder with coarse canvass, or a sheet of thick paper with pin holes; a sheet of tin, punched with holes, the sixteenth of an inch over, is best of all. Keep the bees for twenty-four hours apart.

On the evening of the second day, draw away the tin, paper, or canvass, without disturbing the hives, tap the empty hive, and the bees which have forgotten their queen which you have taken away, will go up into the full hive, as if they belonged to one swarm.

Early the next morning, when all is quiet, set the doubled hive back in its old place; if you pull away the tin too soon the bees will fight terribly and kill many, and perhaps their queen; for fear of this you must take care of the queen you smoked.

The next day, after the stock has been put back to its own place, put this queen to the mouth of your double hive, and

if any accident has happened to their own queen, they will gladly take the stranger to reign over them.

If you put a tin cover, like an extinguisher with holes in it, over your lighted fungus, it will prevent any of the bees being burnt. This way of smoking is very useful to unite a cast to a stock which is weak, in which case you should smoke both; pick out one queen and put all the stupid bees into one hive that has some comb ready made, and sprinkle them over with a little sugar and beer. They will take to one another when they have helped each other to clean off the sugar with their tongues.

The fact of helping each other in their trouble makes them good friends.

Even if you are lucky enough to have none weak, always unite your casts in a hive, which, though strong, has plenty of room; *for the same number of bees will do more good together than they will in two hives.*

The most wonderful thing is, that a double hive will eat no more honey in Winter than a single one; the reason seems that where there are many bees in a hive, they can keep themselves warm by hanging close together instead of eating. So that in a full hive the same quantity of honey goes farther than in a weak hive, as *each bee eats less* (just as cattle well housed require less food than when exposed to wind and rain).

Have all your hives of the same size, and make them all with a hole at the top, an inch over, with a bung to fit into it.

Capping.—In May, when your hives get full of bees and they begin to hang out, put a small straw hive which will hold ten pounds of honey, on the top of the strong hive, and pull the bung out, with a bit of glass worked into the straw, so that you may see when it is full, (a glass, if you can afford it, is prettier.) The bees will sometimes fill this in a week: take it off directly it is full; it will be white honey, and sell better than that taken on the old plan in September. These little caps will give room for the bees to work, who would otherwise be idle, waiting for swarming.

I have had them hang out for a month together, and not only are they idle, but the other bees are forced to feed them.

The cap must not be larger than I have told you, for if larger you will make it so much cooler, they will not swarm at all; and if large, the queen will lay her eggs there, and you will find black combs instead of honey.

This is the easiest plan, till you have got your stock up to its full number. Then it is more profitable to prevent their swarming.

Few cottagers keep enough bees. There is hardly more trouble in taking care of twenty than of two stocks.

In Germany I saw a man who had two hundred hives, and I wish to show you how to make the most of a good year. Get a fair quantity in a middling year, and not lose all your bees in a bad year. 290 lb. has been taken from a good stock without hurting the bees, whilst the heaviest cottage hive I have heard of was under 100 lb.

I have said it is best to prevent swarming; the reason is, the queen bee lays from ten thousand to thirty thousand eggs in the year. In a stock containing three thousand bees, almost all of them in middling years will be busy in nursing the grubs; for they are such good mothers, they think it their first duty to feed their young: gathering honey is their second.

A swarm goes off: you have two queens, with each 3000 bees, busy in rearing the eggs which the queens lay all through the Summer. They have no spare time to gather honey. So in a *bad year*, a stock with plenty of bees will be almost without honey when you take it in Autumn; and sometimes die in Summer if not fed.

Now if you prevent swarming by giving plenty of room, 3000 bees who were before nurses to the grubs of one queen, will be enough to do the nursing-work of the hive, though so much larger, for each has only one queen. And one queen cannot lay eggs enough to require more nurses. The other 3000 will store honey for you in the spare room you give them—which you may take.

Wooden bottoms I prefer to stone or slate, which so chill the bees which come down on them in the winter, they often cannot get back—and the harder the wood the better.

If bees are left out fronting the sun in Winter, every fine day tempts them out; they find nothing out, and return hungry; and many chilled by a cold wind never come back. You may see hundreds round your hives; if you pick them up and warm them in your hand they will revive; which shows they die of cold, not sickness.

The best place to put bees in Winter is a *dry, dark, cold* room or out-house. Put your bees there the last week in November, and let them sleep quietly till the flowers begin to come out—the end of February.

Put their bottom boards sloping, that all the wet may run out of the door, or still better hang them up in a coarse cloth. Weigh them before you put them away and when you bring them out, and you will find them much stronger as well as heavier than those you leave on their Summer stands. If you have no spare room or out-house, perhaps your neighbour has, and would do you the kindness to let you make use of it; which would make good the golden rule of doing as you would be done by.

In old time, a man to begin would borrow a swarm, to be repaid a year or two after, with five or ten pounds of honey for interest.

If more cottagers kept bees much honey now wasted would be saved. 32,000*l.* worth of wax, beside honey, is now yearly imported; and every sixpence of this might go amongst our own cottagers.

The flowers too are the better for the honey being taken; as the bees carry the dust on their legs from flower to flower. And I heard a farmer say, his orchard bore double the crop it had done before he took to bees. One place may be good for bees in Spring near meadows and lime-trees; and another in Autumn, near commons, when heather is in bloom. In Switzerland you may often see a man trudging up the mountains with a hive of bees on his back.

I must repeat, *Never kill a bee.* Let this be your golden rule, and it will prove a golden rule to you in more than one sense.

Be kind to your bees, treat them like reasonable creatures, and they will fully repay your kindness. A bee is a one-year bird; all that are hatched this year die the next, about July or August, after they have nursed up the young ones. So that all the bees burnt in September are of that year's brood, ready and willing to work for you next Spring.

A Clergyman in Switzerland had one stock 60 years, by turning up the hive every year, and cutting out part of the old black comb, which the bees replaced with new comb. To cover straw hives with thick white-wash is good. The straw backle sometimes harbours a mouse, which gnaws through the hive and eats the honey within, which you may dislodge with your magic *fungus.*

And if moths attack your hive, cut out the combs which have the grubs of the moth in them. Defend your hives from moths and wasps by narrowing the door-way when they are about; they teach you what they want by building up little pillars of wax in the door-way. If robbers have taken a hive, use your fungus directly, and join your bees to some hive which wants strengthening, and keep them shut up two days till they get friends.

None but the poor ones rob,
And none but the weak are robbed;
Unite your weak hives,
And feed your poor ones.

You say feeding costs something, but every pound of food given in a cold late Spring, will be repaid when the weather changes; and feed your bees for two or three days after they have swarmed: it saves time in getting the combs made.

You do not waste your honey by feeding, for you will find a peck where you gave a quart.

Sometimes feeding in dry, hot weather will save the lives of the grubs, their dry-nurses cannot then feed. Autumn feeding should not be continued after September; weigh your hives and if short of 20 lb., feed them; then they will lay it all up safe and handy.

Never press your combs, let the honey drain from them: so you will get clear honey; when all has run out save the combs, your bees want food in summer, when they will clear them for you and repay you too. Again I say let nothing be wasted; if you feed with beer and sugar, do not put more than one pound of sugar with a quart of beer; nor boil it more than five minutes.

If the bees sting you, pull out the sting, squeeze out the poison with the pipe of a small key, and put a little honey on to keep away the air, and if done at first the swelling will generally be a mere nothing.

An old writer says, if thou wilt have the favour of thy bees be cleanly in thy person, and do not smell of leeks, or the like, nor *hastily* stir amongst them; but softly moving thy hand before thy face, put them away.

Remember, nothing worth doing can be done without a little trouble, and above all, help each other all you can.

[From the Rev. W. S. Cotton's *Letter to Cottagers.*]

ENGLAND IN THE OLDEN TIME.

II. Justs and Tournaments.

Justs and Tournaments! How many recollections of Knights and Ladies—the former always brave, and the latter always fair—do these terms call up! They formed the very life of the chivalric ages, when the cessation of actual war allowed the knights time for a peaceful display of their prowess.

Tournaments and Justs, though often confounded with one another, differed considerably. The tournament was a conflict between many knights, divided into parties, and engaged at the same time. The just or joust was a separate trial of skill, when one man was opposed to another. The just was frequently included in the tournament, but not always. In the romantic ages both these diversions were held in the highest esteem, being sanctioned by the countenance and example of the nobility, and prohibited to all below the rank of an esquire.

A sort of Tournament, under the name of the Troy game, was practised among the Romans, in which the Roman youths used to exercise themselves in partisan encounters. But the real modern tournament appears to have sprung up about the ninth or tenth century, and was introduced in England shortly after the Norman conquest. Fitzstephen, a writer living about that period says, that every Sunday in Lent it was customary, immediately after dinner, for great crowds of young Londoners, mounted on war horses, well trained, to perform the necessary turnings and evolutions, to ride into the fields in distinct bands, armed with shields and headless lances, where they exhibited the representation of battles, and went through a variety of warlike exercises. Many of the young noblemen who had not attained the honour of knighthood, came from the king's court, and from the houses of the great barons, to try their skill in arms. The youth being divided into opposite companies, encountered one another: in one place they fled, and others pursued, without being able to overtake them; in another place one of the bands came up to and overturned the other, and so on.

There was a kind of justing called the *cane game*, which is said to have had its origin from the following circumstance. Richard Cœur de Lion, being at Messina in Sicily, on his way to the Holy Land, went with his cavalcade on Sunday afternoon, to see the popular sports exhibited without the walls of the city, and, on their return they met in the street a rustic, driving an ass, loaded with hollow canes. The king and his attendants took each of them a cane, and began, by way of frolic, to tilt or just with them, one against another; and it so happened that the king's opponent was William de Barres, a knight of high rank in the household of the French king. In the encounter they broke both their canes, and the monarch's hood was torn by the stroke he received, which made him angry; when riding with great force against the knight, he caused his horse to stumble with him, and while the king was attempting to cast the knight to the ground, his own saddle turned round, and he himself was overthrown. He was soon provided with another horse, stronger than the former, which he mounted, and again assailed de Barres, endeavouring by violence to throw him from his horse, but he could not, because the knight clung fast to the horse's neck. All this incensed the monarch so much, that at the termination of the conflict, he vowed enmity against de Barres, and was with difficulty appeased by the French king. From this singular conflict arose a custom of justing with hollow canes.

In early times it was customary in England for a monarch or a nobleman to entertain many knights at his table, and make justs form a part of the daily routine. King Arthur's round table, was, according to tradition, the board at which a fraternity of valiant knights ate together in friendly communion, after their justs, and in order to set aside all distinction of rank or quality, seated themselves at a circular table, where every place was equally honourable. Roger de Mortimer, a nobleman in the reign of Edward I., established a round table at Kenilworth, for the encouragement of military pastimes; where one hundred knights, with as many ladies, were entertained at his expense. The fame of this institution occasioned a great influx of foreigners, who came either to initiate themselves, or to make some public proof of their prowess.

About seventy years afterwards, Edward III. erected a splendid table of the same kind at Windsor, but upon a more extensive scale. It contained the area of a circle two hundred feet in diameter, and the weekly expense for the maintenance of the table, when it was first established, amounted to one hundred pounds, which was afterwards reduced to twenty pounds, on account of large sums of money required for the prosecution of the war with France. This receptacle for military men gave continual occasion for the exercise of arms, and afforded to the young nobility an opportunity of learning, by way of pastime, all the requisites of a soldier.

In the justs, the combatants generally used spears without iron heads; and the excellence of the performance consisted in striking the opponent upon the front of his helmet, so as to beat him backwards from his horse, or break the spear. Froissart mentions a trick used by Reynaud de Roy, at a tilting-match between him and John de Holland. He fastened his helmet so slightly upon his head that it gave way, and was beaten off by every stroke that was made upon the visor with the lance of his opponent, and of course the shock he received was not so great as it would have been, had he made the helmet fast to the cuirass. This artifice was objected to by the English, but John of Gaunt, duke of Lancaster, who was present, permitted Roy to use his pleasure; though he at the same time declared that for his part he should prefer a contrary practice, and have his helmet fastened as strongly as possible.

The tournaments were conducted with great form and ceremony. The two barons, whose knights were to form the opposing parties in the tournament, were to appear at their pavilions at either end of the barrier two days before the commencement of the ceremony; when each of them had to cause his arms to be attached to his pavilion, and to set up his banner; and all those who wished to be admitted as combatants on either side, were in like manner to set up their arms and banners in the stations allotted for them. Upon the evening of the same day they were enjoined to show themselves at their stations, and to expose their helmets to view at the windows of the pavilion. On the following day the champions were to be at their parade by ten o'clock in the morning, to await the commands of the governor or baron, and on this occasion the prizes of honour were determined. On the morning of the day appointed for the tournament, the arms, banners, and helmets of all the combatants were exposed at their stations, when certain persons were appointed to examine them, and approve or reject them at their pleasure. The examination being finished, and the arms returned to the owners, the baron who was the challenger then caused his banner to be unfurled, and his arms to be nailed

to his pavilion; and any knight who was not at his station at this moment, was not permitted to join in the approaching encounter. The kings at arms and the heralds then went from pavilion to pavilion, crying aloud "To achievement, knights and squires, to achievement!" When the two barons had taken their places in the lists or barrier, the champions or combatants of both parties arranged themselves, every one by the side of his banner. In this position they remained until the signal for the encounter was given.

The description of all the various events of a tournament has been so vividly and so frequently given by historians, poets, novelists, and dramatists, that we need not dwell upon them. The charge of the knights, the unhorsing of some luckless combatant, the shivering of lances, the blowing of the trumpets, and the approbation of the ladies who witnessed the conflict, have formed the theme of many a narrative. In the days of chivalry the justs were usually made in honour of ladies, who presided as judges paramount over the sports, and whose determinations were in all cases decisive. Hence, in the spirit of romance, arose the necessity for every "true knight" to have a favourite fair one, who was not only esteemed by him the paragon of beauty and of virtue, but supplied the place of a tutelar saint, to whom he paid his vows, and addressed himself in the hour of peril; for it seems to have been an established doctrine that love made valour perfect, and incited heroes to undertake great enterprises.

In the case of a tournament where several combatants contended for a prize, such as a rich sword, &c., the combatants, after the termination of the conflict, met in the evening at some place appointed for the purpose, when they were joined by the ladies and by others of the nobility, who had been spectators of the sports, and the time we are told was passed in feasting, dancing, singing, and merry-making. After this the heralds were called together, and were required to give the names of those combatants who had most signalized themselves. The double list of names, (that is one for each party) was then presented to the ladies who had been present at the pastime, and the decision was referred to them respecting the awardment of the prizes. The arbiters selected one name for each party, and, as a peculiar mark of their esteem, the favourite champions received the rewards of their merit from the hands of two young virgins of quality. If a knight conducted himself with any impropriety in a tournament, or transgressed the ordinances of the sport, he was excluded from the lists, with the addition of a sound beating, which was liberally bestowed upon him by the other knights with their truncheons, to punish his temerity, and to teach him to respect the honour of the ladies and t rights of chivalry. The unfortunate culprit had other resource in such cases than that of supplicati the mercy of the ladies who were to be the judg and humbly entreating them to interpose their auth rity in his behalf, because the suspension of l punishment depended entirely upon their intercessio

It may readily be supposed that such excitii scenes as these were not without their effects on tl humbler classes of the community, and that the latt endeavoured to emulate, in some rude manner, tl justs and tournaments of their superiors. There a in existence some old manuscripts, in which are r presentations of a vulgar kind of tournament, pe formed on the water, as in the accompanying cu Two boats have a platform in the middle of each, ar on this platform is situated a man armed with a lanc or with something to serve the purpose of a lanc The rowers in the boats bring the two combatan within reach of each other's lances, and the conte consists in an endeavour on the part of each one overturn the other into the river. When Que Eilzabeth was at Sandwich, she was entertained wi a water-tournament of this kind, at which, it is sai she was highly amused.

The children of the nobility used to have wood horses, and combatants also of wood, mounted wheels, and the figures representing the riders we purposely placed upon the horses in a very insecu manner. Each figure had a lance in its hand, and ea assemblage,—man, horse, and all,—was drawn by string. The contest was to upset the wooden warrio in the same way as "children of a larger growth were wont to do with warriors of real flesh and bloo

Sometimes children of the humbler classes wou have a mock tournament on the ice, making th own legs supply the place of horses, and dubbing stout stick with all the honours of the lance.

When the political condition of Europe, and esp cially the establishment of walled and commerc cities and towns, had brought the age of chivalry tc conclusion, justs and tournaments died at the sar time. When armed knights laid aside their armo and their steel helmets, and the romantic spirit whi sprung up with the Crusades had ceased to exi there was no longer that tone of feeling which led a love of that emulative contest, which formed tl pith and marrow of tournaments. We must n forget however, that the age of chivalry, and th tournaments incidental to it, formed one of the mean by which the female sex was elevated from the mea position in which earlier ages had found them, an paved the way to that more just appreciation of th sex, which is a sure mark of civilization.

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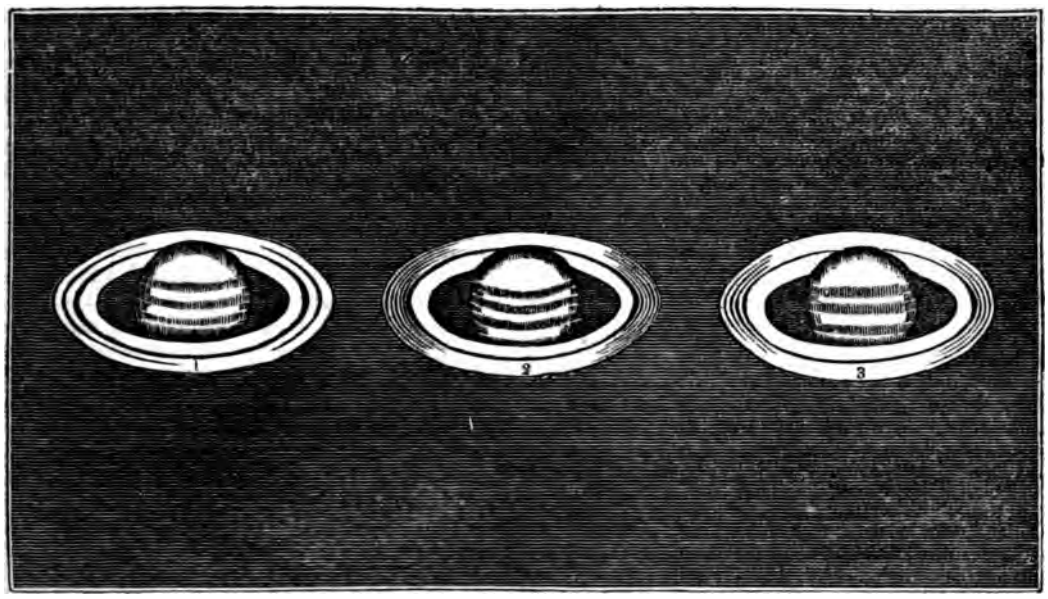
POPULAR ASTRONOMY. PART V

Fig. 33.



THE RING OF THE PLANET SATURN, ACCORDING TO KATER'S OBSERVATIONS.

n making observations upon the heavens, and the globes hich exist and move about in them, the beholder, whether rdinary or telescopic, has his attention arrested at one me by the apparent size,—at another time by the brightess,—then again by the colour,—then by the sparkling,—en by the steady light of the celestial object of his sion:—these circumstances, one or more, are found to pply to the planets spoken of in our second paper, and kewise to the remaining planets, of which we are now bout to speak. But most curious and singular above all, the RING OF SATURN. To this nothing like or similar found in the celestial creation; and so forcibly were we ruck with this consideration, that we were led to assume is wonderful appearance, as our frontispiece, though, in rder, it is the last but one of the planets to be treated of.

It astonishes us that a star should be found at all encompassed, and still more does it astonish us that there should e but one star, as far as our ken has enabled us to judge, hich has so elegant, but mysterious, an ornament. Its ature and uses are matters of speculation, and easily occur, s warranted by fancy, to the mind of the reader of Astroomy; but when the reader finds that there is a planet beond Saturn, which not only has no ring, but even a smaller umber of moons than Saturn, he will feel himself puzzled o account for this seeming discrepancy in the regulation f the planetary globes by the Author of Good, unless he emember for a moment that full observations have not yet een made on the planet Herschel, or Uranus, owing to its mmense distance, and the comparative imperfection of the nstruments of man. To this we may append the consideration, that, by means inscrutable to us, the Almighty has n all probability compensated to other globes the deficiencies which their greater distance has occasioned them.

This consideration will apply likewise to the circumstance f no moon being found to revolve round the planet Mars, hich is farther from the Sun than the Earth: but here, he constitution of its atmosphere is probably such, that so much solar light is absorbed and refracted, that lunar or eflected light is not found wanting. But we cannot afford o linger any longer in the regions of speculation; let us ass on therefore to consider

THE EXTERIOR PLANETS.

THEIR wand'ring course, now high, now low, then hid,
Progressive, retrograde, or standing still,
In six thou seest.——MILTON'S *Par. Lost*, book. viii.

BEFORE we enter into the details of the planets, whose orbits are without that of the Earth, we have to notice a peculiarity in their motions, as seen from the Earth, which results from the circular or elliptical form of their orbits, combined with the annual motion of the Earth. We alluded to this at Vol. XIII., p. 124.

When a planet appears to move from the neighbourhood of any fixed stars, towards others which lie to the east, its motion is called *direct*, because the planets move round the Sun from west to east. When a planet seems to move towards the stars which lie westward, its motion is said to be *retrograde;* and, at other times, it appears to be *stationary*.

Now, as the planet is, in fact, constantly moving round the Sun, as its centre, it is said to have the three foregoing motions, which will be easily apprehended by the accompanying diagram (fig. 34).

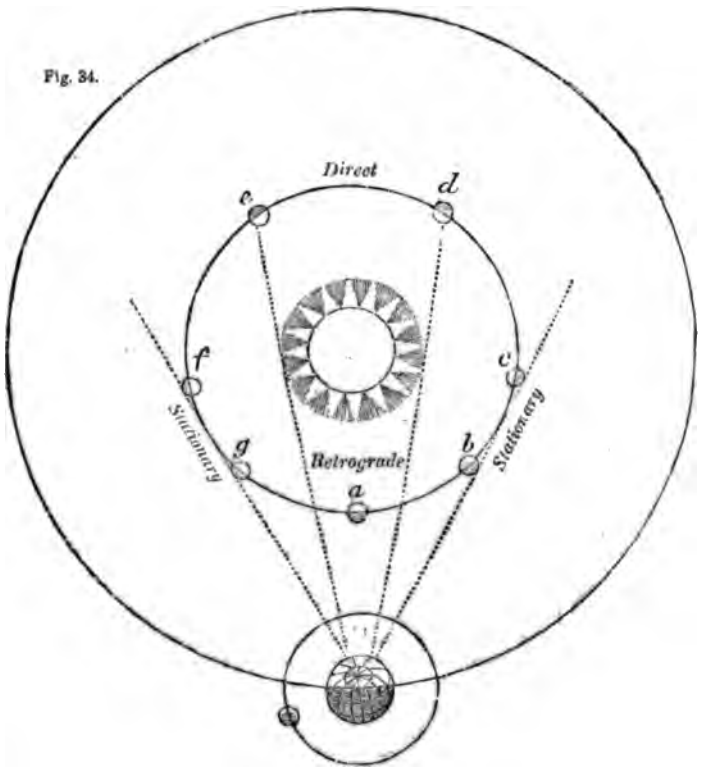
Suppose a planet to revolve round the Sun from west by south to east, according to the letters *a*, *b*, *c*, &c. When the planet is so situated, that a line from the centre of the Earth will graze that part of the orbit where the planet is situated, the planet's motion is said to be *stationary*, as at *b c* and *f g*. The planet is then approaching to, or receding from, the Earth. When the planet is farthest from the Earth, it has its natural or *direct* motion, as from *d* to *e*. But when the planet is nearest to the Earth, as at *a*, its motion is termed *retrograde*, because, owing to the motion of the Earth in the same direction, it seems to go back in its course.

MARS.

See Mars, alone, runs his appointed race,
And measures out exact the destined space;
Nor nearer does he wind, nor farther stray,
But finds the point whence first he rolled away.

THIS is the nearest planet which is exterior to the Earth, and is remarkable for having a more ruddy colour than

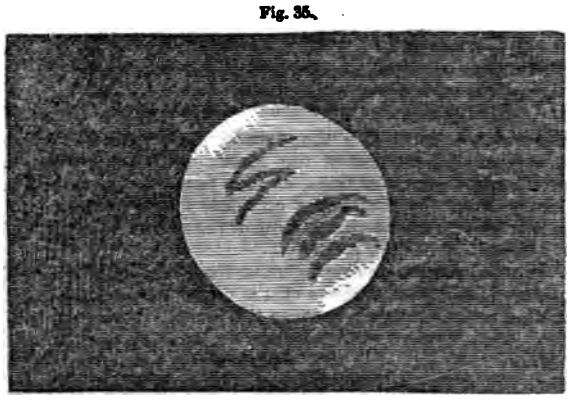
Fig. 34.



MOTIONS OF THE PLANETS.

most of the other planets. This ruddiness is believed to be due to a peculiar constitution of its atmosphere; whereby it absorbs all the component parts of the solar rays but the red, which it reflects.

Fig. 35.

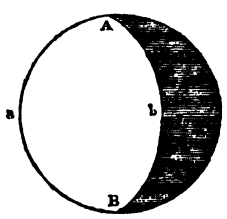


MARS IN THE GIBBOUS FORM.

The mean diameter of this planet is about 4189 miles, being rather more than half the diameter of the Earth. His form is that of an oblate spheroid, which is occasioned by his rotation on his axis, and is much more flattened than that of the Earth, his greater diameter being to his smaller as 16 to 15. He revolves round the Sun in an orbit which is, at the mean distance, about 144 millions of miles from the Sun: this orbit he travels round in about 687 of our days with a velocity of fifty-three thousand miles in an hour. We say *our* days, in order not to confound them with the day of Mars; for, as he rotates on his own axis in about 24 hours 39 minutes, his day is rather longer than ours, so that the period of his revolution is about 668 of his days. His rotation on his axis is estimated by permanent spots on his disk, which appear to be mountains as shown in the figure above.

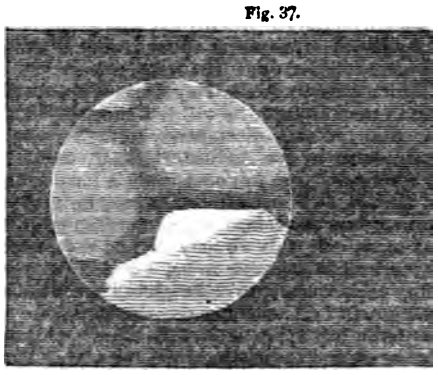
There are some circumstances in the appearance of Mars which confirm the statement that his orbit is exterior to that of the Earth. The appearance which he commonly presents is gibbous. This phase may be illustrated by the following figure, A *a* B *b*. Here we see that A *a* B is a semicircle, and that A *b* B is part of an ellipse; these joined together form the *gibbous* phase. Thus times appears gibbous, (as shown in fig. 35 crescent-formed; as he would if he revolved

Fig. 36.



Earth's orbit: he appears nearly five times as time as he does at another, on account of much nearer to the Earth when the Earth is b and the Sun, than when the Sun is between Earth. When at his farthest distance from t subtends an angle of 4″, and when at his gre an angle of 18″, and the inclination of his plane of the ecliptic is 1° 51′.

Fig. 37.



In Opposition. In Con

THE PLANET MARS.

This planet is about one-seventh of the size and is supposed to enjoy about half the light we have, but in a similar proportion through

from the circumstance that his axis is inclined to the plane of the ecliptic, nearly at a like angle with the Earth's, though he is much farther off from the Sun.

The matter, of which this planet is composed, is about one-fourth lighter than that of the Earth. His rotation on his axis, as determined by the motion of certain spots on his surface, is found out in the same way as was before explained concerning the Sun. See Vol. XIII., p. 34.

No moon has ever been found to accompany this planet; though, being farther from the Sun than the Earth, it would seem to stand more in need of a luminous auxiliary. But, by means of a good telescope, the poles, or extremities of the rotating parts of this planet, are observed to present a white appearance, which becomes fainter when the pole, in the course of the planet's orbit, is turned to the Sun, and more decided when inclined away. These white spots are naturally enough considered to be polar snows, which disappear at the parts of the planet which have been for some time exposed to the Sun, while in the mean time they reappear at the other part; the former being the Summer, the latter the Winter, of Mars.

The axis of Mars is inclined to the ecliptic at an angle of about $30\frac{1}{2}°$. The Earth and Moon would appear like moons to Mars; but, being in an orbit between Mars and the Sun, would never appear quite full.

THE ASTEROIDS.

Until the present century, Jupiter was always considered to be the planet next in order of distance to Mars; but, since the commencement of this century, four little planets called *Asteroids*, because they had the *appearance of stars*, have been discovered, all of which are farther from the Sun than Mars, but less remote than Jupiter. These asteroids, or small planets, are called Vesta, Ceres, Pallas, and Juno, names of celebrated heathen deities of the feminine gender.

Vesta was discovered in 1807 by Dr. Olbers, an eminent German philosopher. It is supposed to be not more than 238 miles in diameter, though this is not yet considered as settled: its mean distance from the Sun is about 225 millions of miles, and it travels through its orbit round the Sun in about 1136 of our days: whether it revolves on its axis is not yet known, on account of its small dimensions. This planet was discovered last of the four, but is nearer to Mars than the others.

Ceres is about 285 millions of miles from the Sun, and is about 1760 miles in diameter: it takes about 1680 days to revolve in its orbit round the Sun. M. Piazzi, of Palermo, in Sicily, discovered this planet on the first day of this century; it appears like a star of the eighth magnitude, and has a ruddy colour.

Pallas is about as far as Ceres from the Sun, and goes round him in about four years and eight months. This planet is stated to be rather smaller than the Moon in size. It was discovered by Dr. Olbers in 1802.

Juno's distance from the Sun is about 301 millions of miles, and it revolves round the Sun in about four years and four months: the diameter has been stated at about 1500 miles. Its apparent size is similar to that of Ceres. It was discovered by M. Harding of Lilienthal, in 1804.

In speaking of these little planets, it is necessary for us to remark that any statements as to their diameters are not much to be depended upon: the extremely small diameters which they present to the eye deprive the astronomer of much of the groundwork on which he builds his calculations. In fact, not only are these planets not seen with the naked eye, but they cannot be observed at all, except with the very best instruments. It is well known that the appearance of the largest and brightest of them, as seen through the instruments at the Greenwich Observatory, is only similar to that of stars of the sixth magnitude; and, when any one of these planets is among stars of such magnitude, it is impossible to distinguish the planet from the stars; and it has often occurred that one of the fixed stars has been taken for the planet and observed for a good while in its stead.

In respect of the position of these little planets in the solar system, we may remark that there was formerly considered to be, as noticed at the end of this article, a wider interval than the proportions of the solar system allow between the orbits of Mars and Jupiter; so wide, indeed, that many astronomers had predicted that some new planet would, at one time or other, be discovered between them. Now it so happens that the four asteroids are very close together, and just at the distance from the Sun at which a new planet might be expected to lie: it is supposed, therefore, by some philosophers, that these four small planets are fragments of a larger planet which once moved in an orbit nearly coincident with the general position of these little planets. What mighty convulsion of Nature could have produced such a catastrophe, we can only conjecture: nothing for certain on such a subject can be known to us, except that "He who could make could also destroy."

It should be observed that the Sun's apparent motion is always in the ecliptic; or rather, this is the path of the Earth among the fixed stars, as it is seen from the Sun. The Moon and all the other planets move within the Zodiac, which is 16° broad; the ecliptic being a line dividing it into two equal parts. The distance of the Moon or of any planet from this line, northward or southward, is the *latitude* of such heavenly body. The latitude of the Moon and the six planets is never greater than 8°, so that they are always *within* the Zodiac; but the asteroids, having oftentimes a greater latitude than 8°, are termed *ultra*-zodiacal, their orbits not being confined within the Zodiac.

Many astronomers are, however, of opinion that the largest of these planets, Ceres and Juno, have not a diameter of more than one hundred miles, and that their average density is about twice that of water. Pallas is said to have a very hazy and extensive atmosphere.

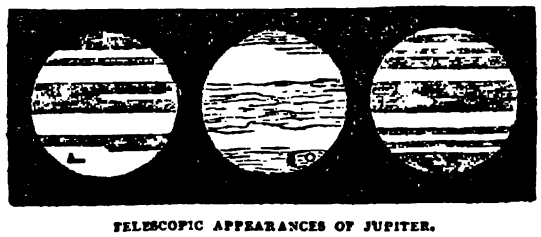
In respect of the orbits of Ceres and Pallas, it should be observed that, though the annual period of the latter is longer than of the former, and though, in mean distance, it is a superior and more remote planet, yet, owing to the greater eccentricity of its orbit, its circumference is smaller than that of Ceres. These orbits, therefore, intersect each other, and may eventually lead to a mutual disturbance between the two bodies in question, unless some extraneous circumstances, such as the attraction of the larger planets, operate to prevent it.

JUPITER.

Beyond the sphere of Mars, in distant skies
Revolves the mighty magnitude of Jove,
With kingly state, the rival of the Sun.
About him round four planetary moons,
On earth with wonder all night long beheld
Moon above moon, his fair attendants, dance.

This is the greatest of all the planets, and consequently the brightest; except Venus, when she approaches near to the earth. Jupiter is an oblate spheroid, his greater diameter being more than 89,000 miles. Owing to his revolving so rapidly on his axis,—the diurnal rotation being completed in ten hours,—he is more flattened than any other planet; his greater diameter exceeding the smaller by 6000 miles,—more than three-quarters of the whole diameter of the earth. He moves round the sun in about 4332 days, which is nearly twelve years, by which his motion in his orbit is about 25,000 miles in an hour; while the motion of any spot on the protuberant part of his surface, due to the rotation on his axis, is about 26,000 miles an hour, which motion is more than twenty-five times as rapid as the rotatory motion of the earth. His mean distance from the sun is computed at 490,000,000 of miles, whereby, if light and heat diminish as the distance increases, the inhabitants of this planet receive only one twenty-fifth of the light and heat which we enjoy. This deficiency, however, is made up in great measure by his turning round so quickly again to the sun, in his rotation on his axis, and likewise by the presence of four attendant moons. It is about 1300 times larger than the earth.

Fig. 38.



TELESCOPIC APPEARANCES OF JUPITER.

The axis of Jupiter being perpendicular to the plane of his orbit, the seasons in this planet must remain constant and the days and nights always of the same length.

This planet, like most of the others, appears larger in

opposition than in conjunction; it being nearer the earth in the former case than in the latter. In opposition he subtends an angle of 46″, and in conjunction an angle of 30″. His form, as seen through a good telescope, is oval; the equatorial diameter being to the polar as 13 to 12. The density of this planet is one twenty-fourth greater than that of water; but, nevertheless, owing to his vast bulk, it has a disturbing influence on the bodies of other planets, comets, &c., and the force of gravity at his surface is eight times that of the earth. His orbit is inclined to the ecliptic at an angle of about 1¼°.

When this planet is viewed through a telescope, he appears to be surrounded by several belts, as may be seen in the preceding figure, which are all parallel to one another: sometimes these belts are reduced to one or two in number, while at other times they amount to seven or eight; from which it has been conjectured that these belts are not existent on the body of the planet, but are caused by certain fluctuations in his atmosphere: sometimes they continue without manifesting any change for two or three months, while at other times they alter their appearance in the course of an hour. Of these *zones*, or belts, the darker parts are supposed to be the body of the planet appearing through a luminous, but cloudy atmosphere.

One of the most remarkable circumstances connected with the planet Jupiter is, the existence of four little moons, which revolve round him in the same way that our moon revolves round the earth. The world owes the discovery of these satellites to Galileo:—they were the first fruits of the invention of the telescope, for which we are also indebted to him. Having perceived that a convex and a concave lens, placed in certain positions with respect to each other, gave an enlarged view of an object seen through them, he conceived the grand idea of applying such a combination to the exploration of the heavens, by which the limited power of the human eye could be augmented. He did so: he placed two such lenses in an organ-pipe, which served him as a tube; and thus he constructed the first telescope which the world ever saw*. On turning this telescope towards the planet Jupiter, he perceived a small star near him; and at different times afterwards he discovered three others, all near the planet: these little stars were found to revolve round the planet; for they would come in front of his illuminated surface, travel to one side, pass round behind him, and emerge on the other side, just as Venus and Mercury do round the Sun. He took them at first for *telescopic* stars, that is, stars seen only by means of the telescope. It was about the year 1610, when this discovery took place.

These satellites may be seen with a telescope which magnifies thirty times, or with a considerably lower power, if the atmosphere be very pure. They revolve round Jupiter in various times;—the first being one day, eighteen hours; the second three days, thirteen hours; the third seven days, three hours; and the fourth sixteen days, sixteen hours:—these numbers are approximations sufficient for our present purpose. Their distances from Jupiter are about as follow:—first, 260,000 miles; second, 420,000 miles; third, 650,000 miles; fourth, 1,150,000 miles. These planets are about the size of the earth, some being a little larger and the others a little smaller than the earth; the first is about one-third, the second three-fourths, the third one-half, and the fourth one-third of the earth's diameter.

The passage of these little satellites in front of the illuminated surface of Jupiter has been of great service to astronomers: first, in determining that light does not pass instantaneously from one place to another, however rapid its motion may be; and secondly, in laying down the longitude of places on the earth's surface. The satellites can seldom be seen on the body of the planet, even with the aid of a telescope, except just at the time of apparent contact; when the satellite, by being somewhat nearer to the sun,—the source of light to the whole system,—appears a little brighter than the planet behind it. They are, however, sometimes seen as darkish spots on the illuminated disk of Jupiter: this has been attributed to the existence of spots on the surfaces of the satellites, similar to those which we observe on the surface of our moon. This opinion is further supported by the fact that the same satellite will appear as a bright spot at one time, and as a dark one at another; probably on account of its exhibiting a different side to the earth at one time from that which it presents at another.

It is remarkable that all these little satellites resemble our moon, in the circumstance that they revolve on their axes, respectively, in the same time that they revolve round the primary planet Jupiter: this fact has been determined by the same means which enable astronomers to establish the like fact with respect to our moon, namely, the constant position of certain spots on their surfaces with regard to the situation of Jupiter, although these greatly vary as seen from the earth; a consequence of this fact is, that these moons always present the same sides towards Jupiter.

As the orbits of three of these are nearly coincident with the orbit of Jupiter, it follows that the Sun suffers an eclipse, as seen from Jupiter, whenever either of these moons is new, or between Jupiter and the Sun: this phenomenon can, by the aid of good telescopes, be seen from the earth, notwithstanding the immense distance which separates the earth from Jupiter: a faint shadow is seen to traverse the surface of Jupiter, occasioned by the passage of one of his satellites between him and the sun. The eclipses, which are, however, most distinctly visible from the earth, are those in which the satellites themselves are eclipsed, by passing into the shadow of Jupiter, behind the body of the planet: the very short period which they occupy in going round their primary planet, Jupiter, render these eclipses extremely frequent.

To an observer on the earth, there is perhaps no spectacle in the heavens more interesting. With a tolerably good telescope they may be seen distinctly, at one time all in the same straight line on one side of the planet; at another, part on one side and part on the other, but still in a straight line. If they be watched for a few hours they will be seen to change their relative positions; and after a while some or other of them will pass into the shadow behind Jupiter, and so they will become invisible; this is called an *immersion*. The act of coming out of the shadow is called an *emersion*. These are in fact eclipses, or occulations; and occur with great frequency on account of the quick revolutions of these moons round the planet. The same may be said of the transits of the moons over the disk of the planet.

The times of the immersions of Jupiter's satellites in the shadow of the planet, and of their emersion, as likewise of the transits of these bodies over the face of the planet, are given in calendars, devoted to astronomy, in order to furnish a means for knowing the longitude, or the difference of meridians, on the earth's surface. The times given in the Nautical Almanack, White's Ephemeris, &c., are adapted to the meridian of Greenwich: so that, if at any other meridian, an observer notice an immersion or an emersion of one of these satellites, or the beginning or end of its transit over Jupiter's disk, to take place one hour, for instance, sooner than the time specified for Greenwich, he knows that he is 15° west of Greenwich; because the sun, in passing round the earth, must make noon and other consequent periods of time sooner to the eastern parts of the world, than to the western; and as he passes over 15° of the earth's surface in one hour, by reason that the earth revolves once on its axis in twenty-four hours, it follows, that to a person situated 15° westward, it will be, for instance, only 11 o'clock, when it is noon at Greenwich. If the observer notice the fact as occurring one hour after the Greenwich time, he may be sure that he is 15° east of Greenwich.

Before Jupiter is in opposition, or so long as he passes the meridian in the morning, the shadow lies west of the planet: and the immersions happen on that side: but after the opposition, the emersions happen to the east.

This method of finding the longitude is more or less accurate according to the practice of the observers, the goodness of the instrument, and the correctness of the tables. The immersion and emersion of the first satellite,—that whose orbit is nearest to the body of the planet,—serves the purpose of the longitude most effectually; the motions of this planet being more clear and defined than of the others.

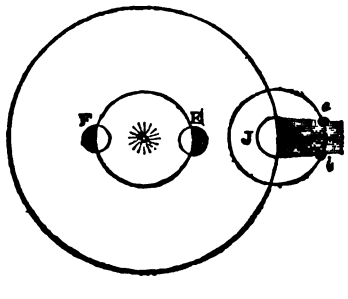
Observations respecting the *progressive* motion of light were first made by noticing these little attendants of Jupiter. It had been usual to consider that light was sudden and instantaneous in its effects. "But there is something so strange in the circumstance that light, as far as the evidence of the senses is concerned, should appear to occupy absolutely no time at all in travelling from place to place, that philosophers have applied many tests, by which they hoped to ascertain whether any portion of time could be estimated during its transit from one station to another. All means, however, failed till about the year 1675, when Römer, an eminent Danish philosopher, ascertained that

* See Tomlinson's *Manual of Natural Philosophy*, p. 500.

ccupies an appreciable, but still very small, portion in travelling from the Sun to the Earth. The cirnce which enabled him to determine this important s, that the eclipses or immersions of the four little which revolve round the planet Jupiter, did not occur ly at the periods which calculation had assigned for the variation being greater at one period of the year another period, six months before or after. From rcumstance he concluded that, when the apparent as greatest, the light traversed a longer path in from those little moons to the earth; and that so gleam of light shed previously to a moon's disape behind the body of a planet, did not reach the eye me time after the commencement of the immersion; the retardation would of course be increased, as the e of Jupiter from the Earth increased. Reasoning ese data, Römer came to the conclusion that the ence of light is *not* instantaneous; but that, like nown agent, it occupies a portion of time in tra- a certain space. Knowing the distances of the ıl heavenly bodies from each other, and testing those es by the apparent retardation of the eclipses of e satellites, Römer computed that light traversed ance from one point of the Earth's orbit to the point, in about eleven minutes. Subsequent cal-s, however, have proved this to take place in about and a half minutes, so that eight and a quarter is the time employed by a ray of light in travelling e Sun to the Earth; which, being a distance of inety-five millions of miles, gives, in round numbers, y of nearly 200,000 miles in a second."—TOMLIN-*Manual of Natural Philosophy*, p. 395.

subject may be well illustrated by reference to the g figure. If we suppose that Jupiter is, upon an , about 500 millions of miles from the Sun, and the bout 100 millions of miles, then, if Jupiter be in tion, or the Sun be between Jupiter and the Earth, 's rays must travel about 500 millions of miles to or his Satellites, and then, after reflexion, about lions of miles back to the Earth, or 1100 millions altogether; whereas, if Jupiter be in opposition, Earth be between the Sun and this planet, the two s of the solar rays amount only to 900 millions of which gives the difference, in point of time, first by Römer.

Fig. 39.



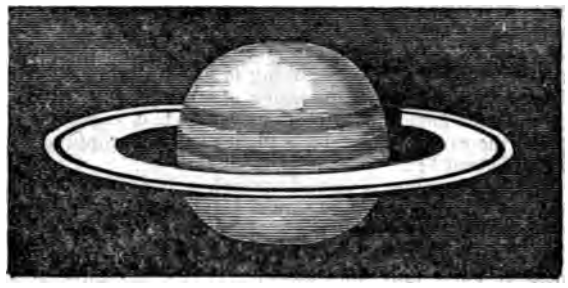
e preceding figure, let J be Jupiter, *e* a satellite its shadow, and *i* a satellite emerging from it. he Earth is at E, Jupiter is in opposition, but when th is at F, the planet is in conjunction. In the case, the solar rays have not so far to travel as in ır.

SATURN.

, outmost Saturn walks his frontier round,
boundary of worlds, with his pale moons,
t glimm'ring through the gloom which night has thrown
p-dyed and dead, o'er this chill globe forlorn:
ndless desert, where extreme of cold
nal sits, as in his native seat,
intry hills of never-thawing ice.
i *Saturn's* earth; and even here the sight,
i these doleful scenes, new matter finds
nder and delight! a mighty *ring!*

anet is distinguished from every other body in the s, so far as discoveries have yet gone, in the circumf being surrounded by a flat luminous ring, extendconsiderable distance from the body of the planet, ner analogous to the wooden horizon of an artificial Till within sixty years ago, it was considered to be the farthest of all the planets; as we found the poet speak of it above.

Fig. 40.



TELESCOPIC APPEARANCE OF SATURN.

Saturn revolves round the Sun in an orbit, the mean distance of which from the Sun is about 900 millions of miles, about 9½ times that of the Earth from the Sun: his diameter is about ten times, and his whole magnitude about 1000 times that of the Earth; and the Sun appears to him to have not above $\frac{1}{90}$th part of the disk, or area, which he presents to the Earth; consequently, the light and heat received by Saturn from the Sun are less than that received by the Earth in the same ratio. Some persons have computed it to be about 500 times as much as that which is afforded by our full moon; whereas our sunlight is estimated at 300,000 times that of our moonlight.

Saturn travels in his orbit about 21,000 miles an hour, and takes up nearly 30 years in passing once round the Sun. He revolves once on his axis in about 10¼ hours. The revolution on his axis produces the same effect as on other planets, namely, flattening him at the poles, and occasioning a protuberance at the equator; the two diameters have been stated as being about in the ratio of 2281 to 2061; it is however, remarkable that the greatest diameter is not at the equator, but at a point nearly mid-way between the equator and the poles—this gives to Saturn somewhat the appearance of a square with rounded corners, as may be observed in the figure above. This was one of the earliest subjects for discovery with the telescope. The density of this planet is about one half that of water. His orbit makes an angle of nearly 2½° with the ecliptic; that is, this planet may have that latitude: and his axis is inclined to his orbit at an angle of about 60°; which makes great variety of seasons though these be slow in coming round. His apparent diameter is, owing to his great distance, much the same at every part of his orbit, and subtends an angle of about 18″. He may be seen in the heavens without the aid of a telescope, if we know at what place to look for him. His disk is crossed by obscure zones, or belts, like those of Jupiter, which vary in their figure according to the direction of the rings.

When Galileo first presented his telescope towards Saturn, he perceived what appeared like two small bodies at the sides of the planet; and he thought at first that this planet was made up of three stars. It was soon found, however, that these lateral appendages changed their appearance, and assumed the form of a *ring* surrounding the planet. If we encircle a ball with a flat ring, and hold it in a particular position, the ring will appear as nothing more than a *line* across the ball; but, if we incline the latter a little, the ring will appear somewhat oval, or elliptical; and if we turn it round a quarter of a circle from its first position, the ring will appear as a *perfect circle*. Now the same thing occurs with regard to Saturn, except that we never see the ring as a *perfect* circle: it is sometimes a line, when the eye is in the plane of the ring; and at other times an ellipse, when the eye is inclined to that plane. The ring does not touch the planet; for a dark vacant space can be seen between them: indeed, the whole would appear dark, were it not that the Sun's light is reflected from it to the Earth: it does not shine by light reflected from the planet, but by that which is derived from the Sun; therefore there are some positions of the Sun, Earth, and Saturn, when the ring is invisible to us. The ring presents its edge towards the Earth every fifteen years, twice in the planet's revolution, but is seen as an elongated oval between those periods: in 1833 it presented its edge towards the Earth, and will do so again about 1848: at present the northern surface of the ring is visible to the Earth.

Sir W. Herschel made many careful observations on this ring, and found that it actually consists of *two* rings, one

within another, with a dark space between them; the ring was found to reflect a stronger light than the body of the planet, and to cast a shadow on the planet, thereby proving its opacity. The latest measurements of this ring are as follow:—

	Miles.
Exterior diameter of exterior ring	176,418
Interior ditto ditto	155,272
Exterior diameter of interior ring	151,690
Interior ditto ditto	117,339
Equatorial diameter of the body of the planet	79,160
Interval between the planet and interior ring	19,090
Interval of the rings	1,791
Thickness of the rings not exceeding . . .	100

Some observers have noticed, that not only does the entire ring appear divided into *two*, but the outer one is likewise subdivided into *several* concentric rings; this, however, has not been confirmed by Herschel and Struve, who have examined it with the finest telescopes ever constructed. The late Captain Kater, about the year 1825, examined this planet very carefully, and noticed the apparent division of the *outer* ring into several circles, as represented in the frontispiece. It seems that this circumstance had been noticed many years before by Mr. Short; and it had been considered as first settled by the elder Herschel, that there were altogether *two* rings; but, according to Kater's report, he saw, in 1825, not only the two rings, but the outer ring appeared to be divided into two parts by a strong black line, as at fig. 1, and each part to be subdivided into at least two others by fainter black lines, as at fig. 3. A drawing made by another person of this appearance is given at fig. 2. Great doubt has been expressed relative to the fact of the outer ring being thus subdivided. Continued observation was interrupted at the time by the ring disappearing, in consequence of the earth coming into its plane: but the subject will probably not be lost sight of by those who have the best means for observation; and, as the ring is now again expanding to view, the opportunity is afforded for deciding whether the effects noticed by Kater arose from an optical delusion, or corresponded with the phenomena of the belts and zones, which cross the bodies of Jupiter and Saturn.

Some astronomers have imagined these rings to be a vast assemblage of satellites. They certainly serve the purpose of many thousand satellites, and, together with the seven acknowledged moons, probably make up the deficiency in the solar rays coming from such an extreme distance.

Seven satellites, or moons, have been discovered to pass in orbits round the planet Saturn. Two of these moons, the nearest to the body of the planet, were discovered by Herschel with his great telescope. The most distant of the satellites is much the largest, and the next is a very conspicuous object with a good telescope; the next three are very minute, and cannot be seen without very good telescopes, while the two innermost have never been seen, except with the most powerful and finished instruments made by man.

But, however useful these moons and rings may be to the inhabitants of Saturn, they do not, as the moons of Jupiter, answer any directly useful purpose to the inhabitants of the earth. Their great distance, and the consequent difficulty of seeing them, render them nearly useless, with reference to the longitude. We leave them, therefore, to act their part as Providence has appointed them, though we cannot but gaze upon and think of them, with astonishment and admiration of the all-surrounding power of the Almighty.

> One *Moon* on us reflects its cheerful light;
> There, seven attendants brighten up the night;
> Here, the blue firmament bedecked with stars;
> There, over head a lucid *arch* appears.

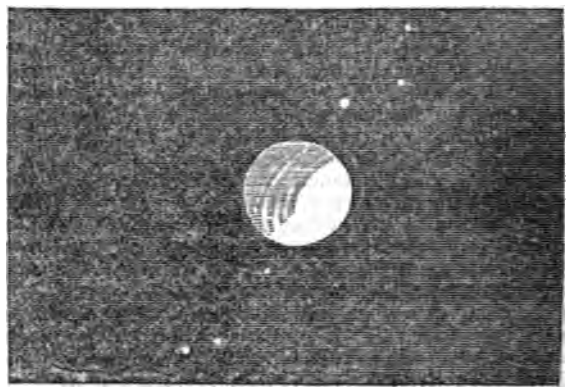
The ring revolves round the planet in about 10 hours and 32 minutes, and in the same plane; which rapidity of revolution gives it a centrifugal force, which keeps it at its due distance in equilibrium.

URANUS.

> From *Earth*, how large, how strong, the Sun's bright ball!
> But seen from *thence*, how languid and how small!
> When the keen north, with all its fury blows,
> Congeals the floods, and forms the fleecy snows,
> 'Tis heat intense to what can there be known;
> Warmer *our* poles than is *its* burning zone:
> Who there inhabit, must have other powers,
> *Juices*, and veins, and sense, and life, than ours.

This is the last and remotest planet in the solar system, as at present known. It is distant from the Sun the enormous quantity of 1800 millions of miles, being about 19 times further from the Sun than the Earth is; he is about 35,112 miles in diameter, and revolves round the Sun in about 83 years and 150 days; this is the year of Uranus. His Summer half-year, therefore, is upwards of 41 of our years, and his Winter half-year equally long. The surface of the Sun appears from this planet not above $\frac{1}{360}$th of that which it appears to the Earth; the light and heat received by Uranus are, therefore, smaller in the same proportion. Hence, it is quite impossible that any such a fluid as water could exist in that planet, for all would be frozen, and no inhabitants, constituted as the inhabitants of the Earth are, could exist on its surface. Its light from the Sun has been estimated at about the quantity which would be afforded by 240 of our full moons

Fig. 41.



THE PLANET URANUS.

This planet was discovered by Sir W. Herschel, at Bath, on the 13th of March, 1781, by means of the magnificent reflecting telescope constructed by himself, which was 40 feet long. The first circumstance which led him to think that it was a *planet*, and not a fixed star, was that, although it appeared like a star of the seventh magnitude to the naked eye, yet it appeared as one of the first magnitude when seen through his telescope. Now one consequence of the immeasurable distances of the fixed stars is, that they do not appear larger when viewed through a telescope than when seen with the eye, the only difference being an increase of brilliancy. From the circumstance, therefore, of its increased magnitude, Herschel concluded that this celestial body was not a fixed star but a comet; subsequently, however, he arrived at the conclusion, that it was a planet moving round the Sun: to this conclusion he was led by observing its continued proximity to the ecliptic, and its motion among the fixed stars from west to east.

This planet subtends an angle of about 4″, which never appears to vary, owing to the comparative smallness of our orbit. Its disk appears uniformly illuminated, and without rings, belts, or spots. Its bulk is however 80 times that of the Earth, and is supposed to be not quite so dense as water. The orbit of this planet is inclined at an angle of 46′ to the ecliptic.

It is just possible to see this planet with the naked eye on a fine clear evening, when the moon is absent, but it has rarely been noticed without the telescope, when it appears of a bluish white colour. It is said to have been seen before, but to have been regarded as a *fixed star*. Tycho Brahé, we are told, set it down in his catalogue of the fixed stars, as also did Professor Meyer, of Gottingen, in the year 1756. When discovered to be a planet, Herschel dignified it with the name of the *Georgium Sidus*, or *Georgian star*, in honour of his royal patron, George the Third, and by this name it is known in the Nautical Almanack. Foreign astronomers call it *Herschel*, from the name of its discoverer; but the Royal Academy of Prussia, and some others, called it *Uranus*, by which name it is now usually known.

At different times Herschel discovered six satellites moving round this planet, for the same purpose probably as those of Jupiter and Saturn move round those bodies; but these satellites are distinguishable only by the highest telescopic means afforded by art. Two were easily marked out by Sir W. Herschel, but the existence of the others depended for a very long time only on his testimony; these,

together with the two innermost moons of Saturn, are the most difficult objects in the solar system to get a sight of. It is considered to be a very remarkable fact, that the planes of the orbits of the satellites of Uranus are nearly perpendicular to the ecliptic, and that their motions in these orbits are *retrograde*, or from east to west, which is contrary to the order of the signs; but, owing to the very great difficulty of observing these attendant bodies, we have not any decided knowledge respecting their masses and motions.

The discovery of this planet and his satellites was one of the triumphs of the Reflecting Telescope, thus beautifully alluded to by the poet:—

> Delighted Herschel, with reflected light,
> Pursues his radiant journey through the night;
> Detects new guards, that roll their orbs afar,
> In lucid ringlets round the Georgian star.—DARWIN.

There are some circumstances connected with the planets, as a system, to which we must here allude. When speaking of the attraction of gravitation*, we stated that each body attracts others in proportion to its mass or quantity of matter. Now one consequence of this is, that a given bulk of any substance would weigh differently at the surfaces of the different planets: that planet which is larger, will attract a body which is upon its surface, towards the centre, with more force than a planet which is smaller; and it is this attraction from the surface towards the centre which constitutes the whole of what we mean by *weight;* consequently, a given mass of matter will weigh more on a large planet than on a small one, supposing the density to remain the same: but, as we have already seen that the densities of the planets vary, the force of their relative attractions must be estimated by the increased or diminished density of the mass, as well as by the actual extent or diminution of size.

There has been noticed a remarkable ratio between the distances of the planets from the Sun. As we shall have to speak of the *power* of a number, we may as well here state that it means a *number multiplied by itself* one or more times. Thus 2^3 means that 2 is to be multiplied into itself twice, or that three 2s are to be multiplied together. If now we call the mean distance of the Earth from the Sun 10, then the mean distances of the other planets are nearly as here follow:—

Mercury's distance		=	4
Venus's	„	= 4 + 3	= 7
Earth's	„	= 4 + $\overline{3 \times 2}$	= 10
Mars's	„	= 4 + $\overline{3 \times 2^2}$	= 16
Asteroids'	„	= 4 + $\overline{3 \times 2^3}$	= 28
Jupiter's	„	= 4 + $\overline{3 \times 2^4}$	= 52
Saturn's	„	= 4 + $\overline{3 \times 2^5}$	= 100
Herschel's	„	= 4 + $\overline{3 \times 2^6}$	= 196

Now we must observe that this tabular law was formed by Professor Bode of Berlin, in the year 1772, before the discovery of the Asteroids and Uranus; and that the void occurring between Mars and Jupiter led several German astronomers to suspect the existence of a planet in that point of space; which surmises received a confirmation by the discovery of the four ultra-zodiacal planets at the beginning of this century; while the law itself had been further confirmed by the discovery of Uranus, as a planet, many years before.

As a curious but faithful illustration of the proportional sizes and distances of the planets, referred to the Sun, we quote the following from Sir J. Herschel.

"Choose any well levelled field or bowling-green. On it place a globe, two feet in diameter; this will represent the Sun; Mercury will be represented by a grain of mustard seed, on the circumference of a circle 164 feet in diameter for its orbit; Venus a pea, on a circle 284 feet in diameter; the Earth also a pea, on a circle of 430 feet; Mars a rather large pin's head, on a circle of 654 feet; Juno, Ceres, Vesta, and Pallas, grains of sand, in orbits of from 1000 to 1200 feet; Jupiter a moderate-sized orange in a circle nearly half a mile across; Saturn a small orange, on a circle of four-fifths of a mile; and Uranus a full-sized cherry, or small plum, upon the circumference of a circle more than a mile and a half in diameter."

* See *Saturday Magazine*, Vol. XII., p. 126.

But when the student of Astronomy shall have come to form a just estimate of the extent of the Solar system, and the magnitude of its component masses, he will yet refer all the members of it, together with the other celestial bodies, to the great concave sphere of the heavens, on which he will trace their various paths, real and apparent. Hence we arrive at the motion and uses of the Celestial Globe; on which the fixed stars are laid down in their several constellations, and by which the course of the sun, and the paths of the moon and planets among the stars may be readily and conveniently traced.

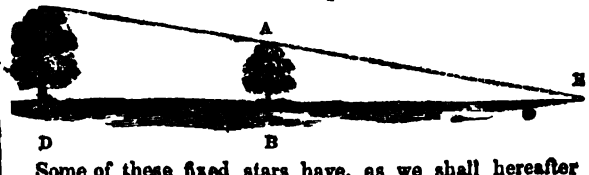
For this purpose the figure at the foot of the present article furnishes the rudiments of the celestial globe; for, as when a person uses this globe, he must fancy himself placed at its centre, so when we direct our attention to the great circles of the heavens, by means of which we estimate the positions and motions of the heavenly bodies, we consider the earth as the central point, as shown in the figure. The axis of the earth being produced both ways, meets the surface of the great sphere of the heavens, at P and Q. These are the poles of the heavens, about which the stars have their apparent or diurnal paths, at right angles to the terrestrial axis, as is seen in the motion of the star at S. If the earth's equator, E C, be carried out to the heavens, the great circle thus formed, ♈ Q, is the equinoctial. The *declination* circles are those which have their centre at the centre of the earth; and which are at right angles to the equinoctial; such as P S M. The use of these circles is to determine the situation of a star, &c.; as the latitude of a place on the earth's surface is reckoned on a meridian. This is the computation for north or south; and as on the terrestrial globe it is necessary to know the east or west distance from a meridian, so, on the celestial globe, this is noted from the first point of Aries, thus marked, ♈. This computation goes on eastward round the globe, and is called the star's *right ascension*.

Again, let O be a spot on the Earth's surface, then Z is its zenith; the nadir being opposite, on the other side. Again, let N E S A be the horizon of O; then N and S are the north and south points, and A and E the east and west points. A circle Z S K drawn through a star S from the zenith to the horizon is the azimuth circle of the star, K S is its altitude, Z S its zenith distance, and K N its azimuth.

A consideration of these few particulars will prepare the reader for the study of the celestial globe.

It is exceedingly curious, as matter of observation to the young astronomer, that the different planets, the members of the solar system, admit of being magnified, or increased in apparent size, according to the power of the instrument with which they are viewed; while the fixed stars, when undergoing the telescopic scrutiny, only cease to twinkle, and remain as bright points, not at all enlarged to the eye. These are perhaps the only objects in creation, as far as the range of man exists, which, as to apparent size, are unacted upon to human vision by a combination of lenses. In the cases of other objects, when viewed, the apparent size decreases as the distance increases, and *vice versâ*:—and the use of the telescope is, by bringing the light thrown from the body to a focus, to enable us to see that body under a larger angle. In the following figure, it is clear that the tree, A B, will appear to an observer at E of the same size as the tree, C D, because both subtend the same angle; whereas, the former tree is much smaller than the latter, but stands much nearer to the observer. Now, if both these trees stood at the same distance from the observer at E, yet, if the tree, A B, were observed through a telescope of a certain power, it might be made to appear of the same size as the tree, C D. Hence we may infer that the sun and planets, if removed away to the space occupied by the fixed stars, would appear, if they appeared at all, only as luminous points. In fact, as each fixed star is deemed to be itself the centre of a system of planets, so our sun is, by parity of reasoning, supposed to be only one of those celestial bodies, which we call *fixed stars*.

Fig. 48.



Some of these fixed stars have, as we shall hereafter notice, different colours apparently inherent in themselves.

LADIES' HEAD DRESSES.

THE absurd practice of removing their flowing tresses, for the mere purpose of substituting a fanciful peruke, is no longer chargeable upon the ladies of England. There are, however, two periods in English history, during which the most extravagant whims prevailed as to the adornment of the head; namely, during the fifteenth and sixteenth centuries, and more recently from about the year 1769 to 1790.

When perukes were first invented by the French, they were only imitated in this country by the male sex, the ladies contenting themselves with ornamenting their heads with false tresses, fastened on by means of pins and bodkins. Speaking of the ladies of England of the first of the periods referred to, a rude and severe critic of the day says,

Then followeth the trimming and tricking of their heads, in laying out their hair to the show; which of course must be curled, frizzled, and crisped, laid out on wreaths and borders, and from one ear to another; and least it should fall down, it is underpropped with forks, wires, and I cannot tell what; then on the edges of their bolstered hair, (for it standeth crested round about their frontiers, and hanging over their faces, like pendices or vails, with glass windows on every side,) there is laid great wreaths of gold and silver curiously wrought, and cunningly applied to the temples of their heads, and for fear of lacking any thing to set forth their pride withal, at their hair thus wreathed and crested, are hanged bugles—I dare not say baubles, ouches, rings of gold, silver, glasses, and such other. But they are not simply content with their own hair, but buy hair, either of horses, or any other strange beasts; dying it of what colour they list themselves. And if there be any poor woman (as now and then we see God doth bless them with beauty as well as the rich), that hath fair hair, these nice dames will not rest till they have bought it. Or if any children have fair hair, they will entice them into a secret place, and for a penny or two, they will cut off their hair; as I heard that one did in the city of *Munidnol* (*Londinum*) of late, who meeting a little child with very fair hair, inveigled her into a house, promised her a penny, and cut off her hair. And this they wear in the same order as you have heard, as though it were their own natural hair; and upon the other side, if any have hair of their own natural growing, which is not fair enough, then will they dye it in divers colours. So whereas their hair was given them as a sign of subjection, and therefore they were commanded to cherish the same, now have they made it an ornament of pride and destruction to themselves, except they repent.

They have also other ornaments besides to set forth their ingenious heads, which they call (as I remember) cawles, made netwise, to the end, as I think, that the cloth of gold, cloth of silver, or else tinsel (for that is the worst wherewith their heads are covered and attired withal underneath their cawles,) may the better appear, and shew itself in the bravest manner; so that a man that seeth them (their heads glisten and shine in such sort), would think them to have golden heads. And some wear lattice caps with three horns, three corners, I should say, like the forked caps of popish priests, with their periwinkles, chitterlings, and the like apish toys of infinite variety.

The author we have quoted, in spite of his ungallant rudeness, appears to have had his admirers, as we may see by the following verses, which are prefixed to his work.

If mortall man maie challenge praise
For anything doen in this life;
Then may our Stubbes, at all assaies,
Injoy the same withouten strife.
Not onely for his godly zeale,
And Christian life accordinglie;
But also for his book in sale
Here present now before thine eye.
Herein the abuses of these daies,
As in a glasse thou maiest beholde;
Oh, buy it then, heare what he saies,
And give him thankes an hundred folde.

The five head-dresses at the top of the engraving were in fashion in the fifteenth and sixteenth centuries, and are far from inelegant, however much they might display the vanity of their wearers. We cannot bestow even this qualified praise upon the ladies' head-dresses during the last century; the figures in the lower portion of the engraving represent a few of these preposterous head-dresses. Those selected from the fashions of 1770 to 1780 are perhaps the most ridiculous from their size, and on account of the great quantity of powder and pomatum employed in their construction. The following directions for the benefit of a country cousin, are extracted from a pocket-book of the above date.

Every lady who wishes to dress her hair with taste and elegance, should first purchase an elastic cushion, exactly fitted to her head. Then having combed out her hair thoroughly, and properly thickened it with powder and pomatum, let her turn it over her cushion in the reigning model. Let her next divide the sides into divisions for curls, and adjust their number and size from the same models. If the hair be not of a sufficient length and thickness, it will be necessary to procure an addition to it; which is always to be had, ready made, and matched to every colour.

The filthy use of pomatum was regarded as necessary to the nourishment of the hair, with as much reason as bears' grease and Macassar oil at the present day. "Still, however," says a writer of that day, "though nothing supports and nourishes the hair so much as powder and pomatum, yet it should be combed out by the roots, with a small comb, twice or three times in a fortnight:" this was some little sacrifice to cleanliness. The popular songs of the day did not fail to satirize these whimsical fashions, as for instance,

Give Betsy a bushel of horse-hair and wool,
Of paste and pomatum a pound,
Ten yards of gay ribbon, to deck her sweet skull,
And gauze to encompass it round.

Her cap flies behind for a yard at the least,
And her curls meet just under her chin,
And those curls are supported, to keep up the jest,
With a hundred instead of *one* pin.

The remaining head-dresses in the engraving represent the fashions of rather a later period. Pomatum and hair powder were still used, the former, however, more sparingly; but the whim arose of frizzling the hair, so as to render it a work of some pain and great labour to disentangle it. In those days a hair-dresser was of much greater consequence than he is at present; and among other qualifications which he should possess, "he ought to be thoroughly versed in physiognomy, and must have a particular regard to the complexion and features of those he is employed to dress, that he may use powder in a becoming proportion, and dress the hair to the dimensions of the face."

WE see a beautiful and infinite variety everywhere presented to us in the works of nature, and man seeks for primary causes of this exuberant effect, but if he forget that First Great Cause on which all others depend, he is quickly surrounded by doubts and difficulties, and finds his reasoning degenerate into conjecture. We sometimes look on the effect, and discover the agent by which it was produced—the human mind is then too frequently satisfied. True philosophy would pursue the subject still further: and thus we should not stop short of that admiration of Divine Power, and humiliation of our own wisdom, which is becoming our present state of dependence—a dependence notwithstanding, under which all may so freely enjoy the boundless riches and beauty everywhere presented to their contemplation.—MAUND.

IN science, as in common life, we frequently see that a novelty in system or in practice, cannot be duly appreciated till time has sobered the enthusiasm of its advocates.—MAUND.

ON THE EARLY MODES OF MEASURING TIME.

3. The Sun-Dial.

We shall now proceed to show how the shadow of any object, on which the sun is shining, may be made a measure of time. But before doing so, we must shortly allude to a difference in the respective lengths of hours, as indicated by the sun.

The earth moves equably on her axis, but not equably in her orbit: that is, she moves through a twenty-fourth part, for instance, of her daily rotation in exactly the same portion of time every year, and in every part of the year; but, in moving through a given part of her annual orbit, she occupies a longer time at some periods of the year than at others. This irregularity in the earth's motion proceeds from two sources: first, the earth's motion round her axis not being parallel to her motion round the sun; and second, the earth's annual path round the sun not being a circle, but an ellipse. Both of these circumstances disturb the equability of the hours, as indicated by the sun. The time, therefore, as indicated by the shadow of an opaque object, cast by the sun, does not quite correspond with the time as indicated by a good clock or chronometer, the former being sometimes in advance and sometimes in arrear, of the other. The deviation is, however, never more than 16¼ minutes, and can always be known by referring to the table of the "Equation of Time," in an almanac.

Our readers may form a rough idea of the origin and nature of the sun-dial by thrusting a stick upright in the ground, when the sun is shining. By observing the shadow of the stick, as cast upon the ground, at different hours and on different days, many useful facts may be elicited. 1st. The shadow will be shorter at noon than at any other part of the day. 2nd. It will be of the same length at any number of hours before noon as at the same hours after noon. 3rd. It will be longer at sunrise and at sunset than at any other part of the day. 4th. It will at any given hour on the 21st of March be just as long as at the same hour on the 21st of September; but at the same hour on any of the Summer days between those periods it will be shorter, and on any of the Winter days longer, than in March or September. 5th. The twelve o'clock shadow will, on every day in the year, be exactly north and south. The causes of these differences are to be found in the two-fold motion of the earth; first, on her own axis, and secondly, round the sun. The sun is more elevated in Summer than in Winter; hence he casts smaller shadows in the former season. Again, he is more elevated at noon than in the forenoon or afternoon: hence again the shadows are shorter at noon than at any other hour.

The shadow of the stick, therefore, would give us some knowledge of the hour of the day and of the season of the year, by comparing its length at different times. But we shall gain much more information if we attend to the *direction* of the shadow, as well as to its length. For instance, on the 21st of March and the 21st of September (the days of the vernal and autumnal equinoxes, when the lengths of the day and night are equal all over the world) the sun rises exactly in the east, and sets exactly in the west. The shadow of the stick therefrom is cast due west at sunrise, and due east at sunset. In the Summer months the sun rises to the north of east, and consequently throws the shadow rather towards the south-west, while in Winter he rises southward of east, thereby throwing the shadow northward of west. Again, at twelve o'clock at noon, (in a northern latitude above the tropic of Cancer) the sun is always due south, and therefore casts a shadow due north.

Now, if all these facts were carefully noted, and marks made in the ground by which the direction and length of the shadow might be compared at different times, much information as to the progress of time and the seasons might be acquired, indeed, a rude sort of sun-dial would be constructed. All sun-dials are merely contrivances, by which the shadow of the straight edge of a projecting piece of metal, or wood, becomes indicative of the number of hours that the sun has been above the horizon, or rather, the number of hours that he is distant from his meridian position. A stick, thrust upright in the ground, would even render information as to the season of the year, in the following manner:—suppose an inhabitant of London (or of any other place in the same latitude 51½°) fix a stick or rod upright in the ground, to the height of exactly two feet. Let him on the 1st of January note the shortest shadow thrown on that day (which will be at twelve o'clock at noon as before stated). On measuring it he will find its length to be 7 feet 3¼ inches. Let him repeat the process on the 1st of each following month, and he will find that the shortest (or twelve o'clock) shadow will measure as follows:—

	Feet	In.
1st of February	5	1
—— March	3	4
—— April	2	1⅝
—— May	1	5¼
—— June	1	1½
—— July	1	1
—— August	1	4
—— September	1	10⅛
—— October	2	10
—— November	4	6
—— December	6	8½

At any time afterwards, therefore, he can, by measuring the noon-day shadow of a vertical rod two feet high, form a rough idea of the season of the year. We must not be understood to attribute any practical value to the foregoing mode of determining times and seasons; but only to observe, that on principles similar to these, sun-dials are constructed.

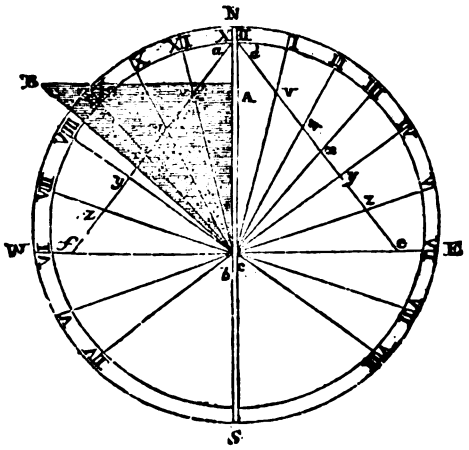
Our readers have probably seen a sun-dial. It has been in great measure thrown into oblivion by those more convenient instruments, clocks and watches. The dial still remains, however, as an ornament on the open lawns of rural dwellings, where, fixed on a pedestal, it is exposed on all sides to the sun. In some countries a sun-dial is of more service than in others. In southern climates, where the atmosphere is purer and clearer than with us in the north, the dial is very necessary to adjust the clock by; the shadow projected by the style being more marked and constant than with us, owing to the more uninterrupted serenity of the heavens. An elaborate dial may be seen in Kensington Gardens, near the palace; and many old buildings in and near the metropolis, contain these relics of the ingenuity of our forefathers.

Dials are chiefly horizontal and vertical. But, whatever be their position, there is always a projecting piece of metal or wood, the shadow of which, thrown on the dial, traverses a certain range of distance from one side of the dial to the other. The position of this index, or shadow-producing body, is a very important part of the construction of a dial; but, whatever be its shape, the edge which casts the shadow is called the *style*; the whole contrivance is termed the *gnomon*, and the part of the dial-plate on which the gnomon rests is the *sub-style*.

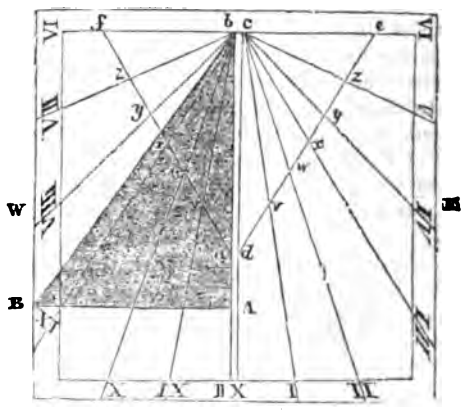
We will now briefly describe the construction of

a horizontal and a vertical dial, these being the most practically useful, and therefore oftenest met with. It should be observed, however, that the style of every dial must coincide, or be parallel with the axis of the earth. It must, therefore, be elevated as many degrees above the dial-plane, as will accord with the latitude of the place.

We construct a *horizontal* dial for the latitude of London, thus:—having described two concentric circles, within which the hour-numbers are marked, as in the annexed figure, we draw two diameters at



right angles to each other, as N S and W E. The east and west line W E need not pass through the centre. If drawn lower down, as in the figure, it gives greater scope for the shadow of the gnomon during the middle of the day, when the dial is most available. We next divide each of the two upper quadrants into six parts, which divisions, however, must not be equal, but the following order must be observed. From the twelve o'clock to the one o'clock line must be an angle of 11° 51′; from one to two o'clock = 12° 26′; from two to three = 13° 44′; from three to four = 15° 32′; from four to five = 17° 31′; and from five to six = 18° 54′, which together make up the quadrant of 90°. The same process must be repeated on the other side of the twelve o'clock line, and the dial will be properly divided. The style must then be inserted where the six o'clock line crosses the meridian line, and it may be either a straight wire, or a thin piece of wood or metal formed into a right-angled triangle, as *c* A B, which is the gnomon. In our figure it appears to lie down, and overlap some of the hour-lines beneath; but when used it must be turned up by a hinge at the side *b* A, which is the sub-style. Thus the gnomon is fixed upon the meridian or twelve o'clock line N S, which is made double, in order to suit the thickness of the gnomon. When perfectly upright, one end of the sloping circle coincides with the point *b c*. The sloping edge *b* B thus becomes parallel to the earth's axis; for, in adjusting the style, or constructing the gnomon, we made the style or line *b* B have an inclination equal to the latitude of the place = 51½° at London. When the dial is thus constructed, the shadow of the oblique edge of the gnomon, *b* B, coincides successively with all the hour-lines, from eight in the morning till four in the afternoon at midwinter, and from four in the morning till eight in the evening at midsummer: these being about the extreme hours of sun-rise and sun-set in the latitude of London. To mark these hours on the lower quadrants of the dial, the hour-lines twelve hours off are prolonged to the opposite part of the circle, as shewn in the figure. The lines *a f*, *d e*, are used when the angular distances of the hour-lines are taken from a scale. A horizontal dial for any other latitude must have the style arranged according to that latitude; and the hour-lines separated by angles which may be obtained from tables found in works on Dialling.



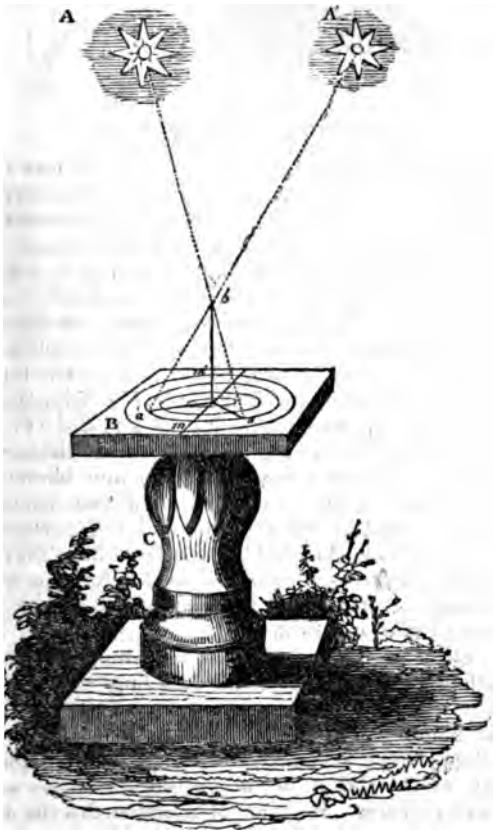
In a *vertical* dial the style is still parallel to the earth's axis, but the noon hour-line is directed downwards. The style, in consequence, points downwards, and makes with the plane of the dial an angle equal to the compliment of the latitude; that is, what the latitude wants of 90°. For London this is 38½°; which is the angle made by the style with the dial-plate. The hour-angles are as follow:—from twelve to one, 9° 28′; from one to two, 10° 17′; from two to three, 12° 9′; from three to four, 15° 15′; from four to five, 19° 33′; and from five to six, 23° 18′. The cross-lines *a f*, *d e*, are for taking these distances off from the scales of hours, latitudes, and chords. In other respects, the construction of this dial will be similar to that of a horizontal dial. A vertical dial need only have one-half of the hour-lines drawn, as the sun never casts a shadow on it before six in the morning, or after six in the evening; its edges being directed east and west.

Before proceeding further, we must explain the method of procuring a meridian line, which is especially necessary in the construction of the horizontal dial, before mentioned.

Suppose we were about to lay a dial-plate horizontally, on the slab B, of the pedestal C, in the accompanying figure. We must of course make the double meridian line coincide with the meridian line, which we shall obtain thus:—Having made the slab *level*, we draw several concentric circles, and fix a wire perpendicular at the centre. Suppose, for instance, that at ten o'clock the shadow of the wire touches the third circle from the centre at *a*, when the sun is shining at A; at eleven o'clock the shadow touches the second circle; at half-past eleven o'clock the third circle. We mark these places respectively where the shadow of the wire cuts each circle. At half-past twelve the sun, having travelled round to A′, cuts the innermost circle; at one o'clock the second circle; at two o'clock the third circle at *a*′. We mark the circles as before. Then dividing these arcs of the circles equally, we draw the line from *m*, through the points of division to the centre; which line lies where the shadow from the wire *b*, fell at twelve o'clock, solar time, and is continued to *m*′.

By the aid of an almanac and a little calculation, a sundial may be made to indicate the hour, by the shadow cast by the moon, in this manner:—Observe what hour-line is marked by the shadow of the style: then find the moon's age in an almanac: take three-fourths of that number, and add the result to the hour indicated by the shadow, and that will be the real hour of the day. For example, suppose the moon's

o be twelve days, and the shadow of the style to
t four o'clock in the afternoon: we take three-
hs of twelve, which is equal to nine, and add that
ur o'clock in the afternoon, which gives one
ck in the morning as the real time. The reason
is is that if the sun and moon were on the same
lian at the same instant on any given day, the
n on the following day would be about three quar-
of an hour later than the sun in arriving at the
meridian: that deviation, therefore, has to be
lated, and added to the observed time. This
od of finding time cannot however be altogether
ided upon, on account of the moon not always
three quarters of an hour later than on the day
e.



e observed that in climates not far removed from
Equator, the sundial is more valuable than in
ns nearer to the poles. We find accordingly that
ylon, or some neighbouring country, was the
iplace of the sundial. Mention is made in the
e, at the twentieth chapter of the second book of
gs, v. 11, of a sundial as having existed in the
of Ahaz, which was about 730 years B. C. The
age is this—"He brought the shadows ten degrees
ward, by which it had gone down in the dial of
z." The word used for *degrees* in the original
rew is equivalent to our term *steps*. Hence St.
me expresses an opinion that there was a pillar, or
mn, erected near a flight of steps, leading up to
king's palace, and that the step, on which the
low of the pillar happened to fall, indicated the
tion of the sun at that moment.

or further particulars on this interesting subject,
refer the reader to a popular treatise in *Tomlinson's
al of Natural Philosophy.*

IPTURE, which is the voice of God, never contravenes
other voice in our understandings; nor calls upon us
lieve that which contradicts the senses that he has given
—BISHOP MANT.

THE CONVICT'S WIFE.

A TALE OF NEW SOUTH WALES.

It is now some years ago that I was leaning over the bridge yonder, looking into the water; I was then twenty-six, and being an orphan, had been put out early to service. I had had but middling luck, but my present place was on the whole the best; to be sure my wages were not high, and I had plenty to do, but my mistress was very kind to me, and, when ill, I was well cared for; I thought of all this afterwards, when it was too late, but then I only pondered on my hardships as I called them, low wages and constant work.

As I was thinking of all these things, a party of young men and women came towards me. I saw among them several that I knew, and I was going to turn away, for I felt too sad at heart to relish their jokes. But they were too quick for me: "Why Anne, what makes you look so cast down," said one: "Pretty Anne should never look sad, it don't become her," said another: "Well I have got something here to make us all look merry," said a third: and then she showed me a paper they had been reading as they came up, which told how that young women who wished to better themselves had nothing to do but to go out to Australia, where they would soon get husbands and comfortable farms, and—but in short I cannot tell you how many good things the paper promised. Not to make my story too long, I will only add, that six weeks after this I was on my road to Portsmouth, where we were to embark for Sydney, in New South Wales. With the little money I had been able to save, I collected some tidy clothes, and a few other little comforts; and my kind mistress, though poor herself, had lessened her slender wardrobe to supply me. She had given me, too, a few excellent books, and a little stock of tea. Thus I thought myself rich already, and my spirits rose higher and higher, when my companions assured me that such a well-looking young woman would be sure to make her fortune.

We embarked, as I have said, at Portsmouth, on the 13th of May: our voyage was said to be favourable; to me, however, it seemed endless: and when I tell you we were eighteen weeks, you will not wonder that I thought it so. For the first three weeks I was quite overpowered with sea-sickness; my companions were as bad, so that I had little help or sympathy. How often, as I lay on my bed, squeezed into a little hole, where I could hardly turn, my head splitting with pain, and faint with sickness, did I think with regret of my quiet little bed-room at home, looking out on the fields, and my kind mistress, sitting by my bedside, with her work, when I was ill. But this did not last for ever; I became more accustomed to the sea, and as my health mended, my spirits rose; so that on the 3rd of June, when they told me we were approaching the isle of Teneriffe, I was able to enjoy the thoughts of once more stretching my limbs on dry ground.

I must not attempt to describe all the strange and beautiful objects that I saw when we landed at the town of Santa Cruz, in Teneriffe. Not the least was that wonderful mountain, which they call the Peak of Teneriffe, of which I sometimes doubted whether it had any top, certainly I never saw it, so completely cloud-capped was it. The getting on dry land seemed quite to restore me. I had been parched up by a continual fever all the way, but the figs and mulberries, of which I got here as many as I could eat for a few half-pence, cooled me and did me good. I filled my basket with these delicious fruits, that I might share them with a poor sick girl on board, who seemed to be neglected by all, and went on board again, full of health and spirits. But I must not dwell too long upon my voyage; I will only add that after landing again, five weeks after this, at Rio Janeiro, a pleasant-looking town in South America, where I laid in another little store of twenty-five oranges, for three-half-pence, which served, I think, to keep me in health, we proceeded, without any storms or accidents, for two months more, which seemed to me a year, for the heat was scorching.

I tried to amuse and instruct myself with the few books my kind mistress had given me, and some that poor Ellen Vaux, the sick girl, had lent me; yet I could not enjoy them in peace, for the young women who were crowded into the cabin with me, when they got well, were very noisy, and were never weary of laughing at me for my *bookishness*, as they called it.

At length, on the 2nd of September, I heard the joyful sound, "Land in sight," and in twenty-four hours more we

landed at Sydney, in New South Wales. There are some things that we never forget; one of such was my first view of that beautiful country. Many years have passed over my head since then, and many sorrows: yet still I seem to see, as if I had beheld but yesterday, its green hills, crowned with the stately gum-trees, and enlivened by the gay blossoms of unnumbered peaches; while a sky, far brighter than any we ever see in England, added to the beauty of the scene. It was Spring—for, strange as it may seem, the seasons are all different in this out-of-the-way part of the world; and when it is Winter with us, it is Summer with them. The air was consequently not oppressive, and I could walk about without inconvenience.

The town of Sydney lies in a valley, and the ridges of rock rising above it on each side, and the large and pleasant gardens which surround many of the houses, give it a very pretty look. The singular shape of the trees, with the beautiful parrots, cockatoos, and other gay birds perched on them, and the market, loaded with melons, oranges, and limes, all told me that I was in a foreign land. But another and a sadder tale was told by the parties of fierce-looking men, in their white woollen frocks and gray jackets, with here and there chains jingling round their legs. These were the newly-arrived convicts, and my heart died within me as I looked at them.

I was soon engaged as a servant by a gentleman and lady of the name of Atkins, and taken to their house, about a mile from Sydney, where he had a large farm. It was a pleasant farm-house, shaded by a grove of the beautiful gum-trees at the back, while the front commanded a fine view of the blue mountains; a garden full of the gayest flowers, such as I had never seen before, half surrounded the house, and on one side was a thicket of myrtles and peach-trees. The bright blossoms of the one, and the dark leaves of the other, thus united, looked more beautiful than you can imagine.

Mrs. Atkins had two children, of which I was to take charge; I had plenty of work to do besides; but my wages were high, and I had always been brought up to work. I kept up my spirits, too, by thinking that it would soon be my turn to have a house and farm of my own. Mrs. Atkins kept two other female servants besides me. One was about my own age, and so good-tempered and pleasant in her manners, that I took to her much; her name was Shirley. The other was a great deal older; she was rude in her manners, and treated Shirley with such crossness and contempt, that I rejoiced for the poor girl's sake when she told me that she did not care much for it, for that she was engaged to be married, and should leave Mrs. Atkins in two months. I was glad on her account, though sorry on my own; but I expected soon to follow her example. Shirley's kindness was not confined to words; she often gave me little presents of tea, of which my stock was nearly gone, and when I tried to refuse it she only laughed, and said it cost her nothing, and that I should soon find that lovers were generous. There was one thing, however, that troubled me much; sometimes as we were talking and laughing together, Shirley would use such words, such bad words, that I was quite shocked. When I noticed it, she would blush, and say she did not know how it was; it was very wrong to be sure; but that there was such a wicked set of people here, that really one learnt wickedness from them. "Why, at my last place," she added, "I had two young women as fellow-servants who were convicts. My mistress thought them quite reformed; but oh! the language they would use down stairs!"

It was a few days after this that my mistress went to spend the day at Sydney; she had told me to take the children into the sitting-room while she was away, and I went into it to set it to rights before I brought them down. What was my surprise to see Shirley standing over the tea-chest, and filling a bag she had with her! I believe I screamed: she started, and looked guilty enough, but said, between laughing and crying, "So you have caught me, have you? but don't tell of me, and I will give you half:" and she held out the bag. I flung it from me, but had not time to speak; for the other woman, who had been at the door, I suppose, though we had not heard her, rushed into the room, and seizing Shirley by the arm, gave her a violent box on the ears. "So I've caught you at last, you thief, have I?" she exclaimed. "I knew you often did this, though I could not find you out; for what can one expect from a convict?" "A convict!" I exclaimed. "Yes, a convict, she replied." "And how dare you tell her I was *a convict?* you know Mrs. Atkins desired you not." "Yes, forsooth, because she said that if you thought your character was not known, it might lead you to behave yourself; much good it has done, truly." They went on giving each other angry words, but grieved and disgusted I left them, and went to the children.

Shirley went away, and, for a week after, I had no other companion than the elder woman, who, proud of her honesty, and having little, I fear, of that true religion, which teaches us to be kind and gentle, was cross and rude in the extreme. Alas! I was little better than she, for when, a few days after, another girl came, who my mistress warned me was a convict, I treated her proudly enough. My home was thus very uncomfortable, but it was not to last long.

About a fortnight after I had been at the farm, I became acquainted with a young man of the name of Davies. He had a small farm about five miles further up the country, but came here once a week to help my master. He soon took a great deal of notice of me. My mistress saw what was going on, and told me she thought it would be a good match for me; for that he was a young man who bore a good character, she believed, and he had a farm which was likely to turn out well. I now felt that I could love him, and indeed loved him too well to fancy any faults in him. Yet I felt uneasy when I considered how little I could really know of him; for I was in a land of strangers, and knew not of whom to inquire. My master had never spoken to me but twice since I had been under his roof; however, I resolved to take courage, and to ask his advice. I took, therefore, the first opportunity I could find, of telling him how I stood with Davies, begging him to put me in the way of finding out his character. He smiled. "You must not be too nice about such points, Anne, in this part of the world," said he: "it is something here to say you know no bad of a man, and *that* I am sure I can say of Davies. On the contrary, all I have seen of him is much in his favour; but he has not been long among us, and as for putting you in the way of hearing more of him, that is what I cannot do; but I will show you a letter, a written character of him, which he had from a gentleman who lives about thirty miles from this." He put the letter into my hands; it spoke most highly of him, and as, when one loves, one readily believes what one wishes, I even reproached myself for having doubted.

A month after this we were married, though there had been one thing during our courtship that rather surprised me. Davies was quite devoted to pleasing me in every way, but he seemed always unwilling to let me visit my future home, though I often expressed a wish to do so; and when my mistress could have spared me to go over, which was not often indeed, he always threw some obstacle in the way. Well, we married, and I went to my home, Mr. Atkins kindly lending us his cart and horse to take me and my things there. Davies had warned me that it was retired, but he had not given me an idea of the desolation that reigned about. A dark and gloomy-looking wood at the back of the cottage, which seemed to extend for miles, was the only ornament of the scene, if ornament it could be called; in the front was a range of barren hills. The garden was neglected, and the farm seemed in poor condition. The cottage was not uncomfortable, but it was rather bare of furniture.

My husband saw that I noticed all this, and kindly told me that things were not quite as he could wish them; but that now he had me there, he should work hard, and set everything to rights. For the first month everything went on well. My husband was very kind to me, and I loved him too well to mind the loneliness of the place. After this one or two things happened to surprise me. My husband went from home part of several days, and when I asked where he had been, he did not seem to like to explain; but only said he had business up the country. Another thing too surprised me, though it was a pleasant surprise certainly. I had been regretting the oranges and limes we used to have at Mrs. Atkins's. Davies said nothing at the time, but a day or two afterwards I found a good supply of each on the table. I could not guess where he had got them, for I knew he had not been off the premises; but when I asked him he only laughed, and said that the fairies had brought them.

One evening I had gone to bed earlier than usual, not being quite well. I had been in bed about an hour, when I heard the kitchen door open gently, and my husband's voice in a whisper, saying "Come in." It then seemed to me as if two people were whispering together. Alarmed at sounds so unusual, I called to my husband. He came to me

after a few minutes; but when I told him what I had heard, he only answered that I must have been in a dream, and when I urged him further, he gave me so sharp a reply, that I was afraid to say more.

About a fortnight after this I had risen early one morning, having a great washing, and being anxious to get over some of it before the heat of the day. My husband was still asleep; and unwilling to awaken him so early, I crept out of the room and went to a shed not very far from the house, to fetch my tubs. What was my terror on opening the door, to see two fierce-looking men stretched on some hay in one corner, fast asleep. I had presence of mind enough not to scream, but carefully shutting and locking the door, I flew back to my husband. He was getting up, and seeing my pale face, seemed at once to guess what was the matter. "Anne," said he, taking me by the hand, "do not be angry with me, for I declare to you that it is my love for you that has made me do what I have done. You have heard of BUSH-RANGERS, have you not? they are escaped convicts who have fled from their masters, and live as they can. I could not bear to see you want many little comforts which you so well deserve, and these men reward me, for shelter now and then, with many little things which you are glad of."

I will not stop to describe all that followed, or how on my knees I implored him to give up these men. He answered me at first kindly, but at last, growing angry, desired me, with an oath, to say no more about it. He then left me, nor did I see him again all that day. He returned at night much out of humour, but did not tell me where he had been, and I was afraid to ask. At last, after eating his supper in silence, he said "The men you saw this morning will be here again presently, and as you are so mighty nice, you had better go to bed." I did not wait to be told twice. I went into my bed-room, and soon after two men entered. They talked for a long time in whispers, but at length their voices were raised, as if in anger, and these dreadful words met my ear—"Why Davies, you, who have been a convict yourself, might have some feeling for us!" I heard no more. I suppose I fainted; for, when I recovered, I found myself on the bed, and my husband sprinkling water over me. He never asked me what ailed me, and his manners towards me, which had gradually been growing less kind, became from this time rough, and even surly. I bore all in silence: alas I had no remedy. I had no friend to turn to, and when I attempted to reason with my husband on the bad company he was keeping, he silenced me with such words as I had never before been used to.

Once I thought of going to Mrs. Atkins, and asking her counsel. We had a little cart and horse, in which the first three Sundays after our marriage my husband had driven me into Sydney to go to church; but now when I asked him to let me have it, he absolutely refused, and when I hinted about walking there, he only said I should be clever if I found my way among those wild hills, and that if I did stray, I should meet with no one to set me right or bring me home. This was, I felt, but too true, and a sense of my forlorn situation made my heart die within me.

Time passed on, but my lot seemed to grow worse. I was likely to become a mother; but this circumstance did not, as I had hoped, soften my husband's heart towards me; on the contrary, it seemed to make him angry; and he often complained of the burden a family would be to one in his condition. Indeed, poverty seemed likely soon to stare us in the face. Our farm was, I believe, good land, if it had been properly cultivated; but Davies had not sufficient capital for this: and what was worse, I had discovered soon after we married that he hated steady labour. His dislike for it indeed seemed to grow upon him, and now he would often be absent for days together. Sometimes he would return in good spirits, and talk of the pleasure of freedom, saying that men should not be set to labour like beasts. Oftener, however, he would be moody and cross, and when I asked him where he had been, told me to mind my own business, and not be prying into his affairs. One evening—it was in the month of November, that is the end of Spring in Australia—I had gone out to enjoy the sweet breezes, and the beauty of the peach-trees, which were rich at once with fruit and blossoms. My husband had been absent for a day and a night, and though surrounded even in this wild spot with much to delight the eye, my heart was too sad to enjoy it. I thought of my home in England: there, indeed, I had plenty of work and small wages, but I had kindness, and I had security. Here I felt in constant terror of I knew not what, and my husband's unkindness made me wish for death to close my sorrows. I had seated myself beside a patch of the Indian wheat, which I had sown only a fortnight before, but which, in this productive climate, was already a considerable height, and was weeping bitterly as I thought of all these things, when suddenly I heard a rustling noise in the wood just behind me, and my husband sprang forward. The sight of him made me tremble; for his face was pale and haggard, and his clothes torn and smeared with blood.

"Anne," he said, in a hollow voice, "give me some food, for I'm famished." I followed him into the house, and set before him a bit of the dried flesh of the Kangaroo, which I was boiling for supper, and a cake of rye bread. He devoured the food hastily, and then starting up, "Anne," he said, "it's no use deceiving you. I joined a party of the bushrangers, in one of their excursions, and have, I fear, been found out. Even now, perhaps, those blood-hounds of policemen are after me. But it matters not; I must have rest, for my strength is gone. I have a safe hiding-place in the wood; do you keep watch for me there, (pointing to the end of the garden, which opened upon the barren country in front of the cottage); if you hear the sound of horses' feet, fly to the gate yonder, that opens into the wood, and blow loudly upon this, (taking a whistle from his pocket); before they can come up, I shall be where they cannot follow. As for you, no harm can come to you, get to Mrs. Atkins, and she will see after you; for you and I can never meet again! I must fly for my life! I have been a bad husband to you, Anne,—but I must not waste time in words; my strength will never hold out if I do not get some rest!" So saying, he left me, and I saw him go through the gate, and plunge into the wood.

What were my feelings, I should in vain attempt to paint. I felt as if sudden madness would seize me. All I can distinctly remember was, that I sank down on my knees, and prayed to God to keep my senses, that I might preserve my husband's life; for even then, after all his cruel treatment of me, my one wish was to save him. I tottered down to the end of the garden, and, sinking on the ground, remained there listening to every sound, till my head was well-nigh gone. Hours seemed to pass in this way. Whether it was night or day I knew not; I was alive to one feeling only,—the desire of catching every sound. At length the noise of horses' feet reached my ear;—terror gave me strength;—I flew to the wood, and whistled loudly, and heard a faint whistle in return. I then ran into the house, fastened the door, and dragged against it all the furniture I could carry, in order that while they were making their way in, Davies might have time to escape. I remember nothing after this till I opened my eyes in a comfortable little bed room in George Street, Sydney.

I learnt afterwards that when the policemen came up, they found me insensible on the floor; they searched in vain, of course, for my husband, and too humane to leave me in that forlorn state, one of them lifted me on his horse, and carried me into Sydney. Just before they entered the town they met Mrs. Adams, well known to all there, as one who spent her time and her money in doing good. That excellent woman told them to bring me to her house, and to her kindness, under Providence, I owe my life. Her care, too, was not for my body only, but for my soul; and through her means it was that I was brought to a better state of mind. A premature confinement of a dead infant was followed by weeks of sickness, during which Mrs. Adams attended me as if I had been her daughter, and led me by her kind and gentle reasonings, to submit with meekness to my trials, and even to feel that "it was good for me to be in trouble."

I have little more to add: I rose up from the bed of sickness in a sadder, but, I trust, in a more Christian frame of mind. Of my husband I never heard more. Mrs. Adams kept me with her for nearly a year, when a good opportunity offering of my returning to England, she wrote a letter by me to her relation, Mrs. Carter, who was good enough to take me into her house, and has been the kindest of friends to me ever since.

SCIENCE, the partisan of no country, but the beneficent patroness of all, has liberally opened a temple where all may meet. Her influence on the mind, like that of the sun on the chilled earth, has long been preparing it for higher cultivation and further improvement. The philosopher of one country sees not an enemy in the philosopher of another: he takes his seat in the temple of science, and asks not who sits beside him.—?

RECREATIONS IN NATURAL PHILOSOPHY.

No. XI.

ON ELASTICITY.

THE school-boy who sticks his knife into the desk and causes it to oscillate by striking the handle, illustrates a fundamental property of matter, namely, elasticity, which consists in the return of a body to its original state when the cause is removed which alters it in form or in bulk.

Bodies display various degrees of elasticity. Air is said to be *perfectly* elastic, because if a gallon of air be compressed into a pint, it will recover its former dimensions when the pressure is removed.

Liquids are also perfectly elastic although it requires an enormous force to diminish their volume slightly; but they regain their original bulk when the pressure is removed.

Solids can scarcely be called otherwise than imperfectly elastic: but the degrees of elasticity are so very various in solids, that the terms perfect and imperfect can by no means be applied to them as a whole class.

If we take an ivory billiard ball and allow it to fall upon a smooth slab of marble, it will bound up again to the hand, and this is a proof of the elasticity of ivory; but how? We will inquire a little further into the observed phenomena.

If we cover the slab of marble with a thin layer of oil, and allow the ball to fall upon it, from the height of five or six feet, we shall find a large circular mark upon the slab larger than a sixpence; whereas, if we simply place the ball upon the slab, it will displace a mere speck of the oil. We must, therefore, conclude that the ball in falling from a height and striking the marble with great force, has actually undergone a change in form: that it has been flattened at its lower part, or how could it possibly displace so large a surface of oil? But we examine the hard ivory ball and can detect no such flattening, for the ball appears to us to be still perfectly round and smooth; we therefore find it difficult to believe that the ball has undergone any change in form.

But when the point of a penknife is stuck into the desk, we can bend the blade considerably by drawing the handle on one side; and then, if we allow it to go free, we shall find that it oscillates or vibrates on both sides of the position it occupies when at rest, and is curved first in one direction and then in the other. After these operations we examine the knife and find the blade as straight as it was before all these bendings occurred, and we conclude that during vibration the blade lost its original form, which, however, it has now recovered.

If this conclusion is so easy, why may we not also conclude that the ivory ball became flattened the moment it met the marble surface, but instantly recovered its original form, and in doing so acquired sufficient force to bound up again to a considerable height?

If we allow a ball of lead to fall upon the marble slab, we shall obtain something like proof that the conclusion just enquired after is the true one. We shall find the under surface of the ball to be permanently flattened, and not recovering its original form the instant it is struck, it will not bound up again nearly so high as the ivory ball. Hence we reasonably affirm that lead is less elastic than ivory.

If we disturb a body from its accustomed position beyond certain limits, one of three events will occur. First, it will return exactly to its original position; or secondly, it will finally settle into a position somewhere between its original and its constrained position; or thirdly, it will break. Bodies, therefore, are said to be most elastic which admit of the greatest disturbance from their original position, and regain it when the disturbing cause is removed: thus a steel spring is more elastic than a strip of glass, because it will recover from a greater disturbance, which would effectually snap the glass asunder; but both these bodies are *perfectly* elastic if they recover precisely their original position. Hence the distinction between *perfectly* and *extensively* elastic.

The modes of disturbance, too, are very various; some bodies are compressed, others bent, or stretched, or twisted, and some are struck. Thus silken strings are more extensively elastic than silver or copper wire, because they can be bent more: the strings of a violin are more elastic than iron-wire, because they can be stretched more, and so on.

A great number of instruments in daily use depend for their action upon the more or less perfect elasticity of the materials which enter wholly or partly into their construction: a piece of steel coiled up, sets a machine in motion in its endeavour to uncoil itself: this is the case in the watch and clock, and the object of winding them up is to bend the steel spring into a coil. In a modern invention elastic chairs and beds are stuffed with iron-wire instead of feathers: and yet the chair and the bed are delightfully easy to sit in, or repose on: the wire is arranged in the form of spiral springs, and hence the value of the invention. Spring balances are constructed on the principle of the perfect elasticity of some of the metals. Thus, in fig. 1, a cylindrical case contains a steel spiral spring coiled round a graduated bar, and fixed at the lower extremity. This arrangement is called a *spring steelyard*, by which heavy goods are weighed, as follows: the instrument is hung up by the ring at A, the goods to be weighed are attached to the hook B: the upper termination of the spiral spring is not fixed, but presses against the under surface of the top of the cylinder. The action of a weight at B is to diminish the spaces between the coils of the spring, and consequently to draw out the graduated rod, and the number of graduations thus presented to the eye, gives the number of pounds attached to the hook B. The value of this instrument depends upon the correctness of the graduated rod, and the *perfect* elasticity of the spiral spring.

Fig. 1.

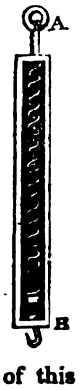
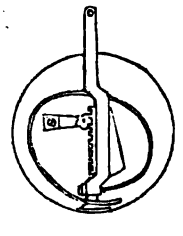


Fig. 2 is a somewhat similar arrangement. The complete circle is the outline of a graduated face, similar to that of a clock. It is seen from behind where the steel spring forms an irregular curve, the flexures of which give motion to a ratchet wheel communicating with an index hand in front of the dial-plate. A large scale pan is attached to the bottom part in which the goods to be weighed are placed. This arrangement is so convenient, that it is extensively employed in coach and wagon offices, railway station houses, &c.

Fig. 2.



The reader will now be prepared to accompany us through several amusing and instructive details on the elasticity of airs, liquids, and solids, which will form the subjects of the next three or four articles.

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STRASBOURG ON THE RHINE. No. I.

VIEW IN STRASBOURG.

here is any river in Europe more celebrated for magnitude and political importance of the events :h have occurred on or near its banks, it is the ıe. The gigantic traffic carried on at London s to the *Thames* a degree of importance which ld not be derived from the other towns on its ks; but the Rhine is literally studded along its es with towns and cities which have had a stamp elebrity given to them, either by the natural beau- of their situation, or by the historical events :h have occurred there. Deriving its birth in the ntainous districts of Switzerland, this noble river s into the lake of Constanz, (or Constance,) at east, and emerges from it at the west, flowing ward, past Schaffhausen, to Basle. Here it takes rthern direction towards Strasbourg, passing by :h it flows near Baden and Carlsruhe: thence by nheim to Mayence. Leaving Frankfort on the ne (a tributary to the Rhine,) a short distance he right, we come to Coblentz,—thence to Bonn to Cologne. Dusseldorf, Wessel, and a few e towns, at length bring us to the mouths of the ıe. On either hand are a great number of import- cities and towns which have not entered into this- neration.

Among the most distinguished of the places which we have mentioned, is *Strasbourg*, (which is also called *Strasburg* and *Strasburgh*). It is the capital of the Department of the Bas Rhin, or Lower Rhine, in France, and is situated at the extreme eastern end of the kingdom. Before the Revolution, France was divided into about thirty provinces; but among the changes which occurred at that eventful period, was the substitution of *departments* for *provinces*. France was parcelled out on a new system into nearly a hundred small portions, each of which was called a department; and these were named, generally speaking, after the principal river which flowed through them. The department of the Lower Rhine, in which Strasbourg is situated, together with that of the Haut Rhin, or Upper Rhine, comprise together pretty nearly the ancient province of *Alsace*.

Alsace was, in early times, a German Dutchy; but in 1268 the line of its dukes becoming extinct, it was parcelled out to several members of the German empire. By the peace of Munster, in 1648, the part of Alsace belonging to Austria, and to ten free cities of the empire, was ceded to France. Several states of the empire had still important possessions in it, which, at the beginning of the revolution, the first

national assembly declared to be a conquest pointed out by nature herself; because, as they urged, foreign powers could not be allowed to retain possessions within the territory of France without danger. Compensation was promised for the losses sustained by the German owners. Few of them, however, were willing to accept it, and this affair was one of the chief causes of the war which took place soon afterwards between France and Germany. By the Peace of Paris, Nov. 20, 1815, a part of Alsace, viz. *Laudau*, was again separated from France, and re-united with Germany; but the remainder, including Strasbourg, still continued a part of France. It may easily be imagined that a city, thus situated, as it were, between two great kingdoms, has frequently been the seat of war. In the early part of the summer of 1796, when the French army crossed the Rhine, and entered Germany, Strasbourg became a scene of conflict. In the autumn of the same year, when the French were expelled from Franconia, Kehl, with its bridge leading to Strasbourg, very nearly fell into the hands of the enemy. Again, in 1796, it was contested ground between the French and the Austrians.

Strasbourg is not actually situated on the Rhine, but about half a mile to the west of it, at the confluence of two small tributaries to the Rhine, the Brusche and the Ille. Its longitude is 7° 45′ E.; and latitude 48° 35′ N. The town is somewhat in the form of a semicircle, and is built on a plain. It is situated in a fertile country, and is well adapted for trade, since the Rhine connects it with Switzerland on the south, and with the Netherlands on the north. The fortifications are very extensive, and the city is entered by seven gates. Towards the east is a citadel.

Although there are one or two good streets in Strasbourg, yet they are, generally speaking, very narrow. The houses are lofty, but deficient in elegance, and are mostly built of a kind of red stone, found in the neighbouring quarries. The city is intersected in various directions by canals, over which are carried numerous wooden bridges. But there is one wooden bridge at Strasbourg, which is said to be the finest bridge in Europe, of that material, its length being 3900 feet, which is more than three times the length of Waterloo bridge. The streets are about two hundred in number, besides several squares, places, &c. The *Place* d'Armée is a square surrounded with good buildings. It is frequented as a public walk. But there are two other places which are greater favourites as public walks, or promenades. One of these is the *Coutadine*, adjoining the city walls; and the other is the *Ruptborshaut*, which is a fine meadow, divided into a number of alleys, or avenues, bordered with trees. There is also a pleasant suburban retreat, called *Robertsau*, which is a little island at the south-east of the town, encompassed by the Rhine and the Ille. It consists of a neat village and a few country houses, and is laid out in many parts with gravel walks, &c. A trip to Robertsau, by the Strasbourgers, resembles in some degree those of the Londoners to Hampstead or Richmond. When Mrs. Trollope visited Robertsau, she saw abundant preparation for entertaining visitors.

The population of Strasbourg is between fifty and sixty thousand. The religion of the inhabitants seems to have been considerably influenced by the changes which have taken place in the government of the province in which it is situated. Strasbourg was one of the first cities of importance to embrace the Reformation; and it had a majority of Protestants among its inhabitants until the latter end of the seventeenth century. It was subjected to France in 1689, and from that time the proportion of Catholics has increased: at present there are supposed to be twice as many Catholics as Protestants. The ancient bishopric of Strasbourg has been secularized, and is now incorporated with France and Baden. It contained five hundred square miles, and about three hundred thousand inhabitants.

Strasbourg is well supplied with public buildings of almost every description. It contains the far-famed cathedral, six Catholic churches, seven Lutheran, and one Reformed. Among its buildings devoted to education, to charitable purposes, or to amusement, are,—a Lutheran academy or university, a Royal Academy, a High School, a Medical School, a Botanic Garden, two public libraries, two hospitals, a theatre, &c. We shall proceed to make a few remarks on such of these as are worthy to be particularized:—and first and foremost, the Cathedral.

The cathedral or minster was founded in 1018, but not finished until 1365. It is one of the most distinguished Gothic structures in Europe. The tower is 474 feet high, being the highest in Europe, and only a few feet lower than the celebrated pyramid of Gezeh, in Egypt. The tower was planned and begun by Erwin, of Steinbach; but, dying in 1318, he had not the pleasure of witnessing the completion of his noble work, which devolved on his brother. The cathedral, seen from a distance, is described as having rather the appearance of a model, constructed with fine wires, than of an enormous structure of stone. The elegant curves of its spiral staircase are seen from top to bottom, and the light is permitted to pass through it on all sides, with a regularity in the form of the apertures, which gives the idea of a transparent embroidery of flowers.

After praising the main body of the building, as being put together with admirable symmetry of proportion, Mr. Russell, in his Travels in Germany, proceeds to say, that the harmony of proportion and the elegance of workmanship appear to still greater advantage in the spire, whose mere elevation, (nearly 500 feet), forms, in the estimation of those who love the marvellous more than the beautiful, the most remarkable feature in the cathedral. There is nothing uncommon in the general form or outline of the tower. The massive base terminates just at the point where, to the eye, it would become too heavy for the elevation, and it is succeeded by the lofty, slender spire, so delicately ribbed that it hardly seems to be supported, and bearing, almost to its pinnacle, a profusion of Gothic ornaments. Yet there is no superfluity or confusion of ornament about the edifice;—there is no crowding figure upon figure, merely for the sake of having sculpture. With more it would have approached the tawdry and puerile;—with less it would have been as dead and heavy as the cathedral of Ulm, which, though exquisite in particular details of sculpture, yet, without being more imposing, wants all the grace and elegance of the fabric of Strasbourg.

When we consider that this cathedral is 130 feet higher than that of St. Paul's at London, we may form some idea of the labour of making an ascent to the top of the spire. The number of steps to reach it is 725, and the nature of the task may be guessed from the following passage from Mrs. Trollope's "Belgium and Western Germany."

I entered the church with the intention of climbing to the top of its spire, but gave it up on listening to the Sacristan's account of the ascent. My son, however, who is not easily discouraged by threatened fatigue, persevered in his determination, and achieved the enterprize; but confessed, when it was over, that it was neither easy nor agreeable. Above half the tremendous height is scaled by steps on the outside of the spire: and although these are protected by a

rail, it is so slight, and its supports are so distant from each other, that it takes but little from its horrors. It is on record that three females have been, at different times, so overpowered by the giddy eminence which they have reached, when climbing it, that they have thrown themselves off, in a momentary fit of delirium, and been dashed to atoms. The latest of these awful accidents occurred within the last ten years; and the man who recounted the tale to Henry, while he was standing on the self-same pinnacle, told him that he had himself witnessed it. He said that the unfortunate creature was quite a young girl: and the first symptom she gave of her senses wavering, was excessive mirth. She laughed and shouted, as if in an ecstacy; and having reached a point where nothing intercepted her view of the abyss below, she sprang off, screaming wildly as she fell. 'The sound of that cry, as she passed down, was terrible,' said the guide. Terrible indeed! too much to bear thinking of.

We may remark, that a number of little statues which surround the great western gateway of the cathedral, are said to be by the hand of a female, who was daughter to the architect of the tower.

One of the remarkable objects which attract the attention of visiters to Strasbourg, is the cathedral clock, described in our Third Volume, p. 156.

MATERIALS FOR THE TOILETTE. II.

On Soap. 2.

The common mottled soap is prepared somewhat differently by different manufacturers; but the following may be taken as a general outline of the process. If potash be the alkali employed, it is dissolved with water in a small boiler over a slow fire, and the solution is poured into a vat containing common wood-ashes mixed with lime. This filters through the ashes, and is then called the *first ley*. The ashes are then turned, a little more lime is added to them, fresh water is poured on, and a *second ley* is obtained. A large boiler is then supplied with the requisite quantity of tallow, to which about two-thirds of the first ley is added, and a moderate heat is applied until the ingredients are incorporated, which is indicated by their assuming the consistence of stiff glue. If this should not take place in about seven hours, (with 29 cwt. of tallow in the boiler,) more ley is added. This process *kills* the tallow, as it is technically called; and when this is effected, the fire is slackened, and the materials left at rest for some time. Common salt is then added, and stirred in with the other ingredients, until the whole assumes the consistence of a thin soapy substance. The mixture is then boiled for a few minutes, and afterwards left to settle for an hour or two; by which means the spent ley sinks to the bottom, and is pumped off.

An exactly similar train of operations is now performed with the second, or weaker ley; viz., boiling with the tallow, adding the salt, and pumping off the exhausted ley. Again, a third time, these processes are performed, with one-third part of the first ley, which was reserved.

The mixture is then boiled for about three hours, until, by occasional trials, it feels sufficiently firm and dry to the touch, and the ley runs clear off, leaving the soap in small lumps. The boiling is then finished, and the spent ley is finally pumped off; after which a froth, which has collected on the surface of the soap, is scraped off, and the soap is fit for *framing*, which consists of pouring the mixture into wooden troughs with moveable bottoms. When stiff enough to be handled, it is taken out, and cut into oblong pieces, and set to dry and harden in an airy room.

It is considered, as stated by Dr. Aikin, that sixteen bushels of good wood-ashes are equal, with respect to the alkali they contain, to one cwt. of the best pearl-ash, and that this latter quantity will saturate two cwt. of tallow, and produce three and a quarter cwt. of soap; so that twelve parts of tallow will make about twenty of soap. Twelve bushels of wood-ashes are also considered equal to one cwt. of barilla, and the latter quantity will saturate one and a half cwt. of tallow. The boiling of twenty-nine cwt. of tallow with ten cwt. of barilla, and five cwt. of pearlash, requires about eight cwt. of common salt. The effect of the addition of the salt is considered to be twofold: 1st, it produces the *graining*, or separation of the soap from the spent ley, and, 2nd, if the alkali be principally potash, the soap remains in the state of a soft pasty mass, until the addition of the salt; whereas, if soda be the alkali, the salt is not necessary.

The process of making yellow soap is very similar to the foregoing; but the ingredients are different. To make 64 cwt. of this soap, the following are given as the ingredients:—twenty-five cwt. of tallow, seven cwt. of resin, eighteen cwt. of barilla, ten cwt. of black ashes, and half a cwt. of palm-oil.

It has been supposed by some chemists that heat is not chemically necessary in these processes; but that strong ley and long digestion would suffice.

What are called fancy soaps, such as French-white soap, Windsor-soap, &c., are made of materials, and by processes, somewhat different from those we have been describing. To make one thousand lbs. of French-white soap, the materials have been stated as five hundred lbs. of barilla, six hundred lbs. of olive-oil, and one hundred lbs. of quicklime. The barilla and the lime are steeped in water for two or three days, after which the liquor is drawn off, and is found to be a strong soda-ley, extracted from the barilla: the ley must have that degree of concentration that a fresh egg will swim in it. A second and a third ley, each weaker than the former, are prepared in the same way. The exhausted barilla is used for manure.

The oil and the third ley are then boiled, during which the second ley is added gradually. After some hours' boiling, the mixture becomes first milky, and then thick and tenacious. The greatest portion of the strongest ley is now added, and the whole kept constantly stirred. The mixture now begins to separate into a thick soapy substance, and a clear liquid, and goes on thus till the separation is complete. When this condition is attained, the spent ley is drawn off, and the soap tried; when, if it be not sufficiently consolidated, more ley is added, and the boiling repeated. The soap is then finished much in the manner which we have before described.

We sometimes see marbled soaps. These are made by mixing black oxide, or brown oxide of iron, with the other materials, in such a manner as to be only partially incorporated with them, and thus to leave a streakiness.

It will be seen that tallow was used in the English soap before described; whereas olive oil was used in the French soap, which difference is very generally observed between the soaps made in the two countries. It will likewise be observed, that no salt was used in the French soap. This was because the alkali was *soda* instead of *potash*.

Pelletier, the celebrated French chemist, made some experiments on the comparative merits of different oily bodies as a material for soap; from which it appeared, that a certain weight either of lard, suet, or butter, produced a greater quantity of hard soap, than the same weight of any one of several different kinds of oil.

Soft soap differs from those which we have been describing principally in the circumstance that potash is used without salt, and therefore does not harden

when combined with the oil or tallow, which forms the other ingredient. The proportions of the ingredients used in its manufacture are stated by Dr. Ure, from the information of a Glasgow soap-boiler, to be as follow:—273 gallons of whale or cod oil, and four cwt. of tallow, are put into the boiler, with 252 gallons of potash-ley, of such strength that one gallon contains 6600 grains of real potash. It is then heated, and acquires a thin gluey consistency: fourteen measures, each holding twenty-one gallons, of strong ley, are then added by degrees; and the whole is boiled until it attains the state in which it is known as *soft-soap*, the quantity of which from the above ingredients is one hundred firkins, of sixty-four pounds each.

Toilette-soaps are made either as a paste, or in the solid state: in the former case the alkali employed being *potash*, and in the latter case *soda*. The oily ingredient is either hogs' lard, butter, suet, palm-oil, nut-oil, or oil of sweet almonds. The rationale of the manufacture of these soaps is much the same as that of the other soaps that we have described, except that more care is bestowed upon the preparation of the fancy soaps.

Dr. Watson has stated that there is a district near Xen-si, in China, in which a kind of natural soap, called Kien, is produced from the ground. After rain has fallen, if the sun shine, there rise out of the earth thick frothy bubbles, which are collected by the natives, and used for such purposes as we should employ *soap*.

ON SOAP. 3.

There are different kinds of spring-water, but all may be included under two heads; viz., *hard* and *soft*. If water, in the process of emerging from the ground, come into contact with *gypsum*, (sulphate of lime,) or *chalk*, or *limestone* (carbonate of lime), which are most abundant minerals, a portion of them is dissolved by the water. Now these substances are insoluble in *soft* or *pure* water: but if the water be impregnated with carbonic acid, (and all water exposed to the atmosphere contains more or less of this acid,) it dissolves them, in proportion as the carbonic acid is abundant. Such water is called *hard*, because it will not dissolve soap, but decomposes it. Soft water, on the contrary, has no action on soap, except that of dissolving it; and therefore it is desirable to employ the latter whenever soap is used as a detergent.

When soap is rubbed with soft water, a smooth, oily feeling is communicated to the hands, which is not perceived when hard water is employed; in the latter case there is a gritty feeling, and a quantity of insoluble curdy matter is produced, which impedes the action of the water upon the soap. Now soap, as we have seen, is a compound of an alkali and a fatty or oily matter. The latter contains two acids, margaric and oleic, which show a considerable tendency to unite with lime; and at the same time the alkali of the soap has an equal tendency to unite with sulphuric acid. The sulphuric acid is derived from the sulphate of lime contained in the hard water; and, as the soap contains an alkali, united to fat, mutual decomposition takes place:—the sulphuric acid unites with the soda of the soap, and remains in solution, and the lime unites with the margaric and oleic acids; all these form the white curdy matter spoken of above.

If the hard water contain carbonic instead of sulphuric acid, the same result is produced; except that the former acid unites with the lime, and forms carbonate of lime, instead of sulphate.

Soap will dissolve in alcohol; and this solution is employed in chemistry, to distinguish hard from soft water. If a few drops of this solution be put into pure water (that is, water containing no acids and no lime in combination with acids, and no earthy matters, &c.), the two liquids will mix without change, or decomposition of any kind; but if a few drops of this solution be added to hard water, the liquid will become thick and muddy, from the formation of the white curdy matter. Of course some waters are harder than others; and the degree of opacity produced by a given quantity of the solution of soap in different waters will direct us in forming a rough estimate of the saline and earthy contents of each. Hard water may also be distinguished from soft, by placing a few thin slices of soap in a glass of the water. Hardness will be indicated by curdy particles and white flakes around these slices. If the water be soft, and the soap not too abundant, the latter will be entirely dissolved.

The presence of acids alone in water, without lime or other mineral or earthy bodies, will also prevent the solution of soap. Their action is to extract the alkali from the soap; so that the fatty matters, being deprived of the alkali which rendered them soluble, have nothing else to make them dissolve.

It is a very common practice in farm-houses and cottages, to filter water through the ashes of their wood-fires, when such ashes are no longer inflammable. For this purpose a conical vessel, generally made of flannel, is suspended from a wooden frame: in the flannel-cone the wood-ashes are placed, and then water is poured on, which filters slowly through into a pan or bucket, placed underneath to receive it. This liquor is termed in most counties *ley*, and is used with, or supplies the place of, soap. It acts as a detergent, by combining with the greasy matters of dirty linen, and (by rendering them soluble in water), removes them: so that, if soap be used with the ley, the former is greatly economized. Hard water, in fact, becomes soft through this process.

The substance extracted from the wood-ashes is known by the name of *pearl-ash*, from its round *pearly* shape; and from the circumstance of its being produced from *ashes*. This substance is an alkali. It is an impure carbonate of potash, and exists ready formed in almost all trees, plants, and vegetable substances. In America, where wood is abundant, vast quantities of pearl-ash are made by burning vegetable matter to ashes by a slow fire in kilns, or pits dug in the ground, whereby much of the ash is saved, which would be dissipated if burnt in the open air.

Pearl-ash is often indispensable to the laundress in the washing of clothes, being necessary where soft water cannot be procured. If sulphate of lime be the cause of hardness in the water, and pearl-ash be added, the sulphuric acid of the lime quits the lime to unite with the potash, to the exclusion of the carbonic acid; the sulphuric acid and potash (sulphate of potash) remain suspended in the water; and this compound does not leave the water hard, since the sulphuric acid does not unite with the soda of the soap, because it has as great an affinity for potash as for soda. The lime falls down as an insoluble powder, and the soap is perfectly dissolved without decomposition. Crude carbonate of soda is often employed instead of pearl-ash, in which case the soap is not decomposed, because the soda of the soap does not quit it to unite with soda; nor does the sulphuric acid of the lime attach itself to the soda of the soap, because there is enough of free soda thrown into the water for its purpose.

SUPERCILIOUSNESS and knowledge, are but rarely the tenants of an individual mind.—MAUND.

NGLAND IN THE OLDEN TIME.

No. III.

Cross-Bows and Bows and Arrows.

AL vanity frequently carries us a great way in ag to Englishmen the possession of powers s superior to those of any other nation. This is remely unjust to our continental neighbours; respect to archery, it appears to be consistent th, for many circumstances combine to as- that the English archers of the olden time those of every other country.

ears probable that archery was introduced land by William the Conqueror, and that its lually extended, until it became a military

But we have little evidence of the use of , until the reign of Edward III, when an is issued to the sheriffs of most of the English , for providing 500 white bows and 500 bun- arrows, for the then intended war against

Similar orders are repeated in the following with this difference only, that the sheriff of tershire is directed to furnish 500 painted well as the same number of white.

mous battle of Cressy introduces us both to -bow and to the cross-bow, or arbalist, and ative merits were tested by the following cir- ice:—Previously to the engagement there fell shower of rain, which is said to have much the cross-bows of the French, or perhaps he strings of them. Now the long-bow, when g, may be very conveniently covered, so as to the rain from injuring it; whereas the arba- cross-bow, is of a most inconvenient form to ered from the weather.

orm of the long-bow is familiar to us, but that cross-bow requires a little description. The ow was much shorter than the long-bow, and ened upon a stock or handle, and discharged is of a catch or trigger, which probably gave he lock on the modern musket. Our engra- presents two cross-bowmen, one of whom is up his bow to its fullest extent, and the other sented as having just let fly the arrow.

e battles in which the English were engaged— ies against the French, and at other times the Scotch—for so many centuries, the long- s the most valued of all the English arms. In guinary battle fought between the English tch at Homildon, in 1402, the men-at-arms r struck a blow, but were mere spectators of ur and victory of the archers. The Earl of s, who commanded the Scottish army in that enraged to see his men falling thick around showers of arrows, and trusting to the good- ness of his armour, (which had been three years making,) accompanied by about eighty lords, knights, and gentlemen, in complete armour, rushed forward and attacked the English archers, sword in hand. But he soon had reason to repent his rashness. The English arrows were so sharp and strong, and discharged with so much force, that no armour could repel them. The Earl of Douglas, after receiving five wounds, was made prisoner, and all his brave companions were either killed or taken.

During the reign of Edward IV. an act passed that every Englishman, and Irishman dwelling with Englishmen, shall have an English bow of his own height, which is directed to be made of yew, wych, hazel, ash, or awburne, or any other reasonable tree, according to their power. The next chapter also directs that butts shall be made in every township, which the inhabitants are obliged to shoot at every feast day, under the penalty of a halfpenny when they shall omit the exercise.

In the reign of Henry VIII. three acts were passed for promoting the practice of shooting with the long-bow: one prohibited the use of cross-bows: another was occasioned by a complaint from the bowyers, the fletchers or arrow-makers, the stringers, and the arrow-head makers, stating that many unlawful games were practised in the open fields, to the detriment of the public morals and great decay of archery. These games were therefore strictly prohibited by parliament. The third act obliged every man, being the king's subject, to exercise himself with shooting with the long-bow, and also to keep a bow with arrows continually in his house. From this obligation were excepted such as were sixty years old; or by lameness, or any other reasonable impediment, claimed an exemption; and also all ecclesiastics, the justices of the two benches, or of the assizes, and the barons of the exchequer. Fathers and guardians were commanded to teach the male children the use of the long-bow, and to have at all times bows provided for them, as soon as they arrived at the age of seven years; and masters were ordered to find bows for their apprentices, and to compel them to learn to shoot with them at holidays, and other convenient times. By virtue of the same act every man who kept a cross-bow in his house was liable to a penalty of ten pounds.

Roger Ascham, an author well versed in the subject of archery, and who lived in the reign of Queen Elizabeth, gives many directions concerning the proper equipment for archery. He says it was necessary to have a bracer, or close sleeve, upon the left arm, and which should be made of materials sufficiently rigid to prevent any folds, which might impede the bow-string when loosed from the hand: to this was to be added a shooting glove for the protection of the fingers. The bow, he tells us, ought to be made with well-seasoned wood, and formed with great exactness, tapering from the middle towards each end. Bows were sometimes made of brazil-wood, of ash, of elm, and of several other woods; but yew was generally preferred. With respect to the bow-string, the author was not decided in his preference; those made with good hemp, in accordance with the common usage of the time in which he lived, those manufactured from flax, and those from silk, might be left to the decision of the string-maker. There are, Ascham tells us, three essential parts in the composition of an arrow, that is to say, the stele or wand, the feather, and the head. The stele was not always made of the same species of wood, but varied as occasion required, to suit the different manners of shooting practised by the archers. He commends sound ash for military arrows, and preferred it to asp, which was in his day

generally used for the arrows belonging to the army; but for pastime he thought that none were better than those made of oak or birch: but after all, says he, I hold it better to trust to the recommendation of an honest fletcher. The feathers of the wing of a goose, and especially of a gray goose, he thought were preferable to any others for the pluming of an arrow. Thus in the popular ballad of Chevy Chase, an English archer aimed his arrow at Sir Hugh Mountgomerye, with such skill that it him on the breast, and

> The grey-goose winge that was thereon
> In his heart's blood was wett.

Ascham proceeds to give full directions for the mode of using the bow. In drawing the bow-string, the right hand was, in ancient times, drawn to the breast, but Ascham prefers the method of elevating it to the right ear. The shaft of the arrow below the feathers ought to be rested upon the knuckle of the forefingers of the left hand; the arrow was to be drawn to the head, and not held too long in that situation; but neatly and smartly discharged, without any hanging upon the string. Among the requisites necessary to constitute a good archer are a clear sight, steadily directed to the mark; and proper judgment to determine the distance of the ground. He ought also to know how to take advantage of a side wind, and to be well acquainted with what compass his arrows would require in their flight. Courage is also an indispensable requisite, for whoever, says Ascham, shoots with the least trepidation, is sure to shoot badly.

Henry the Eighth having appointed a great match at archery at Windsor, a citizen of London, named Barlow, an inhabitant of Shoreditch, joined the archers, and surpassed them all in skill. The king was so pleased with his performance, that he jocosely gave him the title of "Duke of Shoreditch," and this title the captain of the London archers retained for a considerable time afterwards. In 1583, in the reign of Elizabeth, a grand shooting match was held in London, and the captain of the archers, assuming his title of Duke of Shoreditch, summoned a suite or retinue of nominal nobility, under the titles of Marquises of Barlow, of Clerkenwell, of Islington, of Hoxton, of Shacklewell, Earl of Pancras, &c., and these, meeting together at the appointed time, with their different companies, proceeded in a pompous march from Merchant Taylors' Hall, numbering 3000 archers, sumptuously apparelled, every man having a long-bow and four arrows. With the Marquis of Barlow, and the Marquis of Clerkenwell, were horn-blowers. 942 of the archers had chains of gold about their necks. This splendid company was guarded by 4000 whifflers and billmen, besides pages and foot-men. They passed through Broad-street, the residence of their captain, and thence into Moorfields by Finsbury, and so on to Smithfield, where, having performed several evolutions, they shot at a target.

It seems agreed by modern archers, that if the length of the bow be equal to the height of the shooter, the greatest power can be attained; and the arrow should be about half the length of the bow: with these proportions a strong man can send his arrow from 200 to 240 yards. Ascham said that it required training from early boyhood to hit the target well; and Strutt seems to confirm this in the following passage:—

> I have seen the gentlemen who practise archery in the vicinity of London, repeatedly shoot from end to end, and not touch the target with an arrow; and for the space of several hours without lodging one in the circle of gold, about six inches in diameter, in the centre of the target; this indeed, is so seldom done, that one is led to think when it happens, it is rather the effect of chance than of skill: which proves what Ascham has asserted, that an archer should be well taught early in life, and confirm the good teaching, by continual practice afterwards. We may also recollect that archery is now followed for amusement only, and is to be commended as a manly and gentlemanlike exercise. I remember about four or five years back (about 1795) at a meeting of the Society of Archers, in their ground near Bedford-square, the Turkish ambassador paid them a visit, and complained that the enclosure was by no means sufficiently extensive for a long shot; he therefore went into the adjacent fields to show his dexterity, where I saw him shoot several arrows, more than double the length of the archery ground, his longest shot falling upwards of 480 yards from his standing. The bow he used was much shorter than those belonging to the English archers; and his arrows were of the bolt kind, with round heads made of wood.

Our ancient chroniclers and ballad-writers revel in the feats of archers in the olden time. Robin Hood and his merry men, clad in Lincoln green, have been familiar to us from infancy; and there is another ballad, called "the Names of the Three Archers," written in the same spirit. Adam Bell, Clyne of the Cloughe, and William Cloudesle, are introduced to shoot before the king. The butts or targets, set up by the king's archers, were censured by Cloudesle, as being too large for any but a learner to deign to shoot at: he therefore set up two hazel rods, at 400 yards distance from each other. Standing at one, he shot at the other, and cleft it in two. The king, being much surprised at the performance, told him he was the best archer he ever saw. Cloudesle, to show that his skill was not yet sufficiently known, proposed to exhibit a more astonishing proof of it. He bound his eldest son, a child only seven years old, to a stake, and placed an apple on his head. He then charged him not to move, and turned his face from him, that he might not be intimidated by seeing the arrow directed towards him. Six score paces were measured from the stake: Cloudesle took his station, and

> . . . Then drew out a fayre brode arrowe;
> Hys bow was great and longe,
> He set that arrowe in his bowe
> That was both styffe and stronge.
> Then Cloudesle cleft the apple in two,
> As many a man might se,
> Our Gods forbode, sayde the Kynge
> That thou sholde shote at me.

Archery, after gradually dying away, has again revived within a few years, and has become a somewhat favourite exercise near London, and probably in other parts of the country. In Scotland the Royal Company of Archers, the King's Body Guard for Scotland, has existed for several centuries, and at the present day comprises among its members a large portion of the Scottish nobility. When King George the Fourth visited Scotland in 1822, the Company claimed the prerogative of acting as Body Guard to him. His Majesty was graciously pleased to recognise their claim, and the Royal Company were thus established as the King's Body Guard for Scotland. They attended his Majesty at court, and on all state occasions during his residence in Scotland, and accompanied him on his visit to Hopetown House, from whence he embarked for London. The captain general has since been appointed Gold Stick for Scotland, and the Royal Company now forms part of the household. There are about 500 members, who meet weekly, and at certain seasons contend for several annual prizes.

IT surely is one of the prominent frailties of human nature, that we are incapable of duly appreciating those favours which are offered to us at little cost. The inference is plain: we place fictitious value on what we desire, and on what we possess; and it may be instructive to carry our researches further into the affairs of this present life, and endeavour to ascertain what real importance attaches to any of those objects which we aim to obtain. It may be useful, although disagreeable, to discover that we run after bubbles, which burst in the hand.—MAUND.

ON DIVING.

It was part of the sublime scheme of creation, that man should have dominion over all living creatures upon the face of this beautiful world, which the Almighty assigned to him as a dwelling place. The fish of the sea and the fowls of the air are alike the subjects of man's controul; and not content with subduing them, and learning their structures, habits, and modes of existence, man has attempted to become familiar with their haunts. Unrestrained by physical difficulties, gifted with ingenuity and energy, and calling to aid all the resources of science, art, and industry, man soars above the clouds, or penetrates into the chambers of the deep, in search of the riches which nature has buried therein, or to recover the wealth which he himself has already lost.

The difficulties which the diver has to encounter are consequent on his physical formation. The moment he plunges below the surface of the water he is removed from the atmosphere which is necessary to his existence. If we hold the mouth and the nostrils, so as to prevent the lungs from communicating with the external air, great pain and inconvenience will soon be experienced. No one can continue the act beyond a minute or a minute and a half: yet this is the act performed in the simplest and rudest state of diving, where, by constant practice, men have inhaled at the surface, a sufficient quantity of air to last them for two minutes under the surface of water. If, previous to the descent, the carbonic acid existing in the cells of the lungs be expelled by four or five forcible exhalations, and then a full inhalation of atmospheric air be made, the diver, it is said, can, without difficulty, remain two minutes under the surface of the water.

A person can also remain a longer time under water if, previous to his submersion, he inhale compressed air; such, for example, as the air in a diving bell, already many feet below the surface of the water. Mr. Brunel relates, that at the time when he descended in a diving bell, to examine the breach which the river had made in the tunnel under the Thames, he lowered the diving bell about thirty feet to the mouth of the breach; that this being found too narrow to admit the bell, he took hold of the end of a rope, and dived himself down into the opening: having remained down about two minutes, his companion in the bell becoming alarmed, gave the signal to those above for pulling up: but Brunel not being prepared for the signal, had hardly time to secure the rope which he had relinquished, and was surprised on getting into the bell, to hear that he had been in the water two minutes. On re-descending, he found that he could remain under water that space of time without difficulty, because the air in the bell being condensed by a column of water nearly thirty feet high, contained nearly double the quantity of air in the same space, and thus nearly a double supply to the lungs.

The unassisted diver has also another difficulty to encounter, besides that of holding the breath; the pressure of the water on the chest becomes so great at great depths, as to be almost intolerable. This pressure increases upwards of sixty pounds on every square foot on the surface of the diver's body, for every foot of descent; and if the chest expose half a square foot of surface, the pressure thereon, at the depth of fifteen feet, is equal to 450 pounds; a load which tends to expel the air enclosed in the lungs, and consequently calls for great muscular exertion on the part of the diver, and often produces bloodshot eyes and spitting of blood.

Diving can therefore only be regarded as a rude art, adapted to a rude people, without much mechanical aid. Numerous wonderful tales have been related of the feats of some celebrated divers. One of these stories we will detail in a second article on diving, our present object being to afford a succinct account of the art and its history, up to the invention and general use of the diving bell, to which latter subject we propose to devote a separate article.

Among the divers in various parts of the world, those of Ceylon, engaged in the pearl fisheries, are celebrated. Some of these divers are said to have remained six minutes below the surface of the water, but strong doubt exists regarding this statement. The late Admiral Hood, when at Ceylon, determined to test the powers of the best pearl divers by an appeal to his own watch, and found the ordinary time which a diver could remain submerged to be one minute; and, in one or two cases, a minute and a half. In this pearl fishery there are generally ten divers to each boat: five descend into the sea at a time, while the remaining five remain above, to renew their strength. In order to hasten their descent a large stone is used with a rope attached to it, which the diver seizes with the toes of his right foot. Grasping another rope with his right hand, and keeping his nostrils shut with his left, he soon reaches the bottom. He speedily collects oysters, puts them into a net which is hung about his neck, and, upon giving a signal he is hauled up immediately by those in the boat.

These divers are all Indians, and have undergone much previous training. They often descend forty or fifty times a day: the exertion is very great, and they frequently discharge water and blood from their mouths, ears, and nostrils. Some stuff their ears, and cover their bodies with greasy substances: they do not eat while in the boats, since they find that food in the stomach is oppressive while engaged in diving. They are often exposed to a dreadful enemy while under water, viz., the ground-shark which inhabits these seas: some of the divers are expert enough to avoid this animal, but all of them are extremely apprehensive of him, and consult their priests or conjurers before they go upon a diving excursion.

The divers for sponges in the Archipelago are said to descend with a piece of sponge dipped in oil in their mouths, the object of which is to calm the small waves on the surface of the sea, which prevent the light from being so steadily transmitted to the bottom as is necessary to enable the divers to discern the objects they are in search of. By spitting out a little oil, it rises to the surface, and becoming diffused, it calms the waves, and a clear and steady light is transmitted to the bottom.

The writer has heard of a jewel, dropped by accident into a rough but shallow sea, being recovered by throwing a little oil on the waves, which enabled a person sent in search of the trinket to discern it with ease.

Some of the natives of the South Sea Islands, by constant practice from infancy, become very expert divers, and swim round the ships which visit their coasts, for the purpose of begging small articles of European manufacture. It is said that when a nail or other small article, is thrown overboard, they never fail to recover it by diving; and on one occasion, a smith's anvil having fallen overboard, the natives secured it by diving many times, rolling it over towards the shore at each descent.

We come now to notice a few contrivances which have been invented for assisting the diver in his attempts to remain under water for an indefinite length of time. It is obvious, that to be successful, the

objects of every diving apparatus must be to supply the diver with fresh air, and prevent the entrance of the water into the mouth, nostrils, and ears. These objects have been more or less attained by water-tight armour, made so strong as to protect the body from the pressure of the water at great depths; together with respiratory tubes, passing up above the surface of the water, so as to enable the diver to breathe. This forms one class of apparatus. A second class consists of water-tight vessels of metal, inclosing the diver, together with a quantity of air, to support respiration for a limited period, such as twenty minutes. Apparatus of this kind enables the diver to protrude his arms by means of flexible sleeves; glass lenses are also provided, through which the diver can witness and direct his own operations.

These descriptions of apparatus are nearly all objectionable, and far inferior to the diving bell, which we shall hereafter describe. The best armour, perhaps, that has ever been contrived, is that known by the name of its inventor, M. Klingert. The accompanying figure represents the diver equipped in Klingert's armour. This dress is made of strong tin plate, in the form of a cylinder, consisting of two parts, the head-piece, or helmet, and the body. In addition to this, there is a leathern jacket, with short sleeves, and a pair of leathern drawers; both are made water-tight, by being buttoned to the metal part of the dress, where they are secured with brass hoops going round the leather and the metal on the outside. The air is supplied by two distinct flexible pipes, proceeding from the inside of the helmet to the surface of the water: one pipe is for inhaling the air, and terminates in an ivory mouth-piece, which the diver embraces with his mouth: the other enters the helmet at the same place, and merely opens into the interior of the machine, so as to allow the foul air to be discharged. The diver draws in fresh air with his mouth, and discharges it with his nostrils, and from the inside of the machine it is propelled by inspiration, the expansion of the chest contracting the space between it and the armour, and forcing out exactly as much air as is drawn in, so that a due equilibrium is thus constantly maintained.

To the metal dress hooks are attached, on which weights are hung, to keep the diver down. He makes signals by means of a rope attached to his arm, or by speaking through the tube. When he wishes to ascend, he unhooks the weights and fixes them to a rope let down for the purpose, and then, being lighter than his own bulk of water, he ascends.

Klingert's armour is still in use in the construction of hydraulic works, in places inaccessible to the diving-bell.

M. Klingert is also the inventor of a diving chest of the form of a hollow cylinder, capable of holding fifty-eight cubic feet of air, which he calculated would enable the diver to remain submerged about two hours. This vessel (used in conjunction with the armour) was suspended from a boat, but could be raised or lowered by means of a pump compressing or dilating the inclosed air. From a description of this diving chest in the *Encyclopædia Britannica*, it appears, that the ballast is so adapted to the size of the machine, as to make it sink so far, that only a cubic foot of it remains above water. In this state an additional weight of 100 lbs. will depress it below the surface, or make it sink to the bottom. The effect of adding extra weights, is produced by diminishing the volume of contained air by condensing it into a smaller space. To accomplish this, a large cylinder is applied to the bottom of the vessel, and provided with a piston, which by a rack and pinion, can be moved from one end of the cylinder to the other, when the diver turns a handle through the side of the machine, and commu motion by a worm and wheel to the pinion of t The lower end of the cylinder opens to the w the upper end opens within the machine; t when the diver turns the handle in the direction the piston in its cylinder, it necessarily dimini bulk of the included air, and the machine sin on depressing the piston in the cylinder it will again. The inventor proposed to furnish the with two small oars to move it in the water, anchor or grapnel, to make it fast whilst th walks about on the bottom, within the limit length of the pipe, to examine sunken bodies cover the best mode of raising them.

Various other forms of diving apparatus ha contrived, a description of which, would be rather than instructive. We have already said to show the general nature of diving apparatu ductory to an account of the most useful and ant of all diving machines yet contrived, Diving Bell; to which we shall devote a article.

MAN EQUIPPED IN KLINGERT'S ARMOUR PREPARATORY TO

We read, that in certain climates of the world, t that spring from the land, carry a refreshing sme sea; and assure the watchful pilot, that he is approa a desirable and fruitful coast, when as yet he cannot it with his eyes. And in like manner it fares wit who have steadily and religiously pursued the cours Heaven pointed out to them. We shall sometimes their conversation towards the end of their days, t are filled with hope, and peace, and joy: which, li refreshing gales and reviving odours to the seam breathed forth from Paradise upon their souls; a them to understand with certainty, that God is l them into their desired haven.—TOWNSON.

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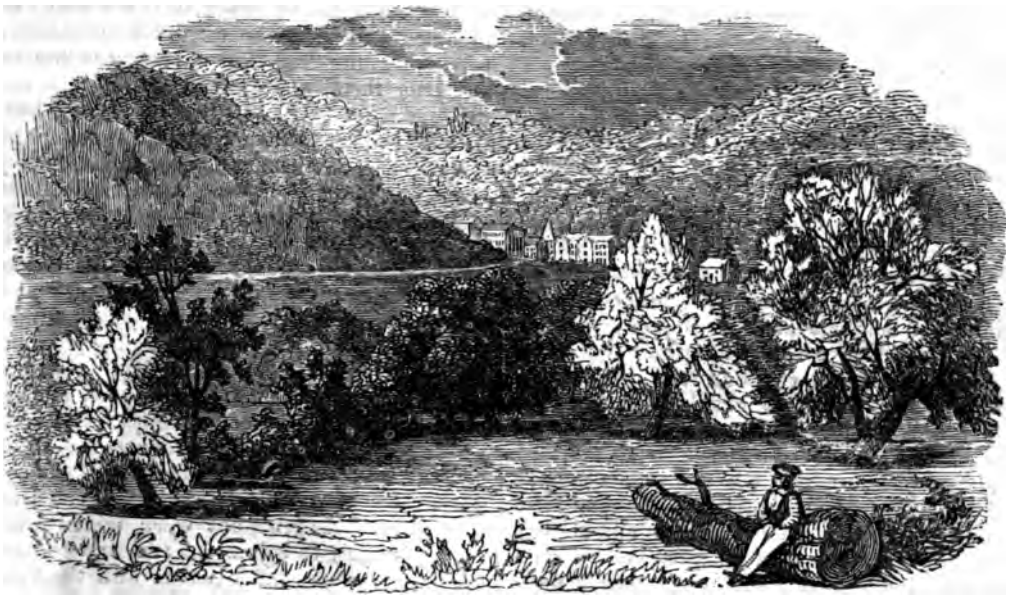
ON THE GENERAL LOCALITIES, NATURE, AND USES, OF MINERAL WATERS.



THE VALLEY AND BATH-HOUSE OF SCHLANGENBAD.

Drilled through the sandy stratum, every way
The waters with the sandy stratum rise;
Amid whose angles infinitely strained,
They joyful leave their jaggy salts behind,
And clear and sweeten as they soak along.

Thus does the poet, Thomson explain one of the tural processes by which water is purified. In, and out London, we have an example of the filtration of ter through sand. The clay and the gravel in this trict extend 300 feet, and sometimes more, below surface; under these is the sand. If we bore a hole ough the clay and gravel, so as to get at the water the sand, it will come filtering and purifying, ough the latter substance; probably all the way m the chalk hills to the north and south of the ley in which the London basin of clay is ated. The clay above the sand, being very heavy, ses upon it, and forces the water above the sure in a jet, as soon as the opening is completed.

But it often happens that the water, instead of rising through sand, by which it is filtered and purified, s through soils containing iron, silex (or flinty th), muriate of soda—or more properly chloride of lium (common salt), sulphate of magnesia (Epsom ts), carbonate of lime (chalk, marble, or limestone), phate of lime (gypsum), sulphuretted hydrogen , carbonic acid gas, &c. One or more of these retained by the water; and so affect its taste, lour, and chemical characters, that its effects on animal system are various. Sometimes the effect beneficial, at other times the contrary.

Water thus impregnated, has also a decided effect many of the arts. The brewer, the paper-maker, bleacher, and many others, are often subject to convenience, from the impurities contained in the ters they employ; so that it has occupied the emist in many valuable researches, to ascertain the ture of the waters, to point out their uses in medicine, and to obviate their inconvenient effects in art. It is for this reason, that we treat of mineral or medicinal waters, separately from those more common forms of water which fit them for general domestic use.

Some mineral waters contain nitrogen and sulphurous acid gases, and a variety of substances in addition to those already mentioned. We shall, therefore, consider briefly the subject of medicinal waters according to their properties, and the leading ingredients which they contain, under the following heads:—1. The *Acidulous*, or *Carbonated*; 2. The *Sulphurous*; 3. The *Chalybeate*; 4. The *Saline*.

1. The carbonated waters are such as contain a considerable quantity of carbonic acid. Soda water (as it is called) consists chiefly of carbonic acid gas and water, the gas being mechanically combined with the water under great pressure. This gas imparts to water a sharp and somewhat acid taste (hence the term acidulous); and it presents a sparkling appearance when poured from one vessel into another, arising from the particles of the acid passing into the gaseous form and escaping from the water. This escape of gas always ensues when the water is exposed to the air; it may be liberated in greater quantity by heating the water, and boiling expels it altogether.

The presence of free carbonic acid in water may be detected by adding lime-water to it, as a cloudiness immediately ensues. The rationale of this is as follows: lime is prepared by burning chalk (or any carbonate of lime), at a red heat, for several hours; by this means the greater portion of its carbonic acid is expelled, and the resulting lime is soluble, to a certain extent, in water. Now if lime-water be added to water containing carbonic acid, (the attraction between lime and carbonic acid being stronger than that between carbonic acid and water,) the gas will quit the water to unite with the lime, and the latter will

be reconverted into chalk, which is less soluble in water than lime, hence the cloudiness in the mixture. Now, although chalk, or carbonate of lime, is scarcely soluble in water, yet water containing carbonic acid dissolves it easily, so that the cloudiness in the above mixture may be removed by adding to it more carbonic acid, or more water containing carbonic acid. Hence many hard waters and mineral waters contain much carbonate of lime, because the carbonic acid in the water imparts a soluble property to the latter.

The most celebrated carbonated springs are those of Seltzer, Pyrmont, Spa, and Carlsbad, but they all contain saline matters in addition to the carbonic acid. A wine pint of Spa water afforded:—

Carbonic acid	13 cubic inches.
Carbonate of soda	1·5 grains.
Carbonate of magnesia	4·5 „
Carbonate of lime	1·5 „
Muriate of soda	0·2 „
Oxide of iron	0·6 „

The same quantity of Pyrmont water yields 26 cubic inches of carbonic acid, and 30 grains of saline matter, *i. e.*, 10 grains of magnesia, 5·5 of Epsom salts, and 8·5 of sulphate of lime. The same quantity of Seltzer water contains 29 grains of saline matter, 17 of which are common salt, and yields 17 cubic inches of carbonic acid. The Carlsbad waters give only 5 cubic inches of gas from a wine pint, but contain 10 or 12 different salts.

Dr. T. Thomson says, that the Spa waters may be termed either acidulous or chalybeate, for they are a combination of both. Their effect is stimulating, and they promote the secretions, especially with respect to the kidneys and the skin. The general effect of the carbonated waters is stimulant, and they are even capable of producing a certain degree of transient intoxication; they are also useful in bilious affections, and as an agreeable drink in fevers, but are injurious in cases of flatulency or indigestion.

Many of our readers have doubtless read that very entertaining work, *Bubbles from the Brunnens of Nassau*, in which the properties of some of the German waters are described with much graphic power, and no little humour. The author, Sir F. Head, visited the Seltzer spring among others. This spring is situated at the village of Nieder-Selters, in Nassau, a place which he describes as a "world of stone-bottles." The fact is, that the water of the "brunnen" or "bubbling brook" of Selters, or Seltzer, is sent in stone-bottles to every part of Germany, to Paris, London, the East and West Indies, &c., and as the whole supply is obtained from one spring, a busy scene necessarily presents itself in the vicinity of the well. The opening of the well is about five feet square, and the bottles are filled by being placed in a crate or frame, (which will hold seventy bottles,) and lowered into the well. The air is expelled, and the bottles filled with water in about twenty seconds; the crate is then drawn up and removed to one side; immediately after which another crate, suspended from another arm of the same crane, is lowered and filled in the same manner. In this way three crates are engaged at once; one being lowered into the well, another being supplied with empty bottles, while the filled bottles are being removed from the third. The processes are continued with great rapidity. Two men place corks in the bottles, two more hammer them down, women and girls carry the bottles (one hanging on each finger of each hand) to a bench, where the corks are cut off close to the bottle; the bottles then pass into the hands of women who tie white leather over the corks, two men dip the corks, leather and all, into melted resin, two others stamp the seal of the Duke of Nassau upon the soft resin, and finally the bottles are stored in a warehouse. All this is done in an incredibly short time, and the process is continued from three in the morning until seven in the evening, after which hour the inhabitants may help themselves. This privilege is granted to them by the duke, to whom the well belongs, and to whose ancestors it was sold for a butt of wine. The enormous quantity of 1,295,183 bottles were filled for exportation in 1832, besides half a million for private consumption. Sir F. Head saw twenty-five bins of bottles, each four yards broad, six deep, and eight high, all waiting to be filled. The duke gives sixpence per hundred for having the bottles filled, and sells them, when filled, for thirteen florins per hundred.

With respect to the effects of this water the author remarks. "The best analysis I can offer of the Seltzer water, is the plain fact that the inhabitants of the village, who have drunk it all their lives, are certainly by many degrees, the healthiest and ruddiest looking peasants, I have anywhere met with in the dominions of the Duke of Nassau." He remarked, that the taste of the water when drunk at the well, had more of the chalybeate quality (which we shall explain presently) than when drunk from the bottle.

2. *Sulphurous Waters.*—These are marked by a peculiar fœtid odour, resembling that of rotten eggs, which they owe to the presence of sulphuretted hydrogen in the water; indeed this gas is formed during the putrescence of eggs. It consists of sulphur and hydrogen, but when mixed with water, (which largely dissolves it,) and exposed to the air, the oxygen of the latter unites with the hydrogen of the gas, and the sulphur which remains is deposited as a yellow sediment.

Waters of this kind are distinguished by rendering metallic silver black, or causing a brownish-black precipitate with a solution of acetate of lead, or nitrate of silver. This arises from the union of the sulphur with the metallic silver or lead. It acts in this way on several of the metallic oxides, an amusing instance of which we will relate. A nitric solution of bismuth, mixed with a small portion of muriatic acid, when diluted with water, throws down a beautiful subtile white milky powder; this being collected and washed with cold water, appears in minute scales of a pearly lustre, and constitutes the *Pearl Powder* of the perfumers. In this state it is employed as a cosmetic by those ladies who are dissatisfied with the natural complexion of their skin. One of these ladies went to bathe in a sulphurous water bath, and and came out as one of "Ethiop's sable daughters," the sulphuretted hydrogen having blackened the oxide of bismuth of her "genuine" Pearl Powder.

The sulphuretted hydrogen gas may be expelled from these waters by the application of heat.

Among the most noted sulphurous springs are those of Aix-la-Chapelle, Harrowgate, and Moffat. One wine gallon of Harrowgate water contains:—

Sulphuretted hydrogen	6·4 cubic inches.
Carbonic acid	5·25
Nitrogen	6·5
Carburetted hydrogen	4·65
	22·8 cubic inches of gas.
Common salt	735·0 grains.
Muriate of lime	71·5
Muriate of magnesia	43·0
Bicarbonate of soda	14·75
	864·25 grains of saline matter.

There are about fourteen wells at Harrowgate, all possessing mineral qualities, differing somewhat from

ne another, but possessing a general sulphurous haracter.

Sir F. Head, in the work before quoted, speaks of powerful sulphurous spring at Langen-Schwalach, in Nassau. This spring was, in the time of the omans, in the heart of an immense forest; but as ıe virtues of the water became gradually known, uts and hovels were erected, which afterwards gave ay to houses, and, lastly, to a town. The spring is bout eighteen inches below the ground. The water ontains a little iron, but is principally sulphurous, nd a suffocating gas ascends from it; yet, notwithtanding this circumstance, the Jews who live in the illage constantly drink, cook, and wash with the water.

In Mrs. Trollope's *Belgium and Western Germany*, he waters of Aix-la-Chapelle are thus alluded to:—

The hot springs are abundant, and held to be highly alubrious. The one which is of the highest temperature, ises at Borcette, a little town perfectly distinct from Aix, but close to it. This Borcette spring is much too hot for the hand to endure, but I doubt its being actually boiling, as I have heard stated; we saw, however, several women take pails of it for their washing, and were told that they never find it necessary to use any other in the process. The large smoking caldron, which is open in the middle of the street at Borcette, has a very strange appearance, the vapour rising and spreading up and down it to a considerable distance.

The general effect of sulphurous waters upon the system are of a cleansing character. In all eruptions, diseases of the skin, ulcers, &c., they are found to be valuable when used as a bath, and when used as a drink they stimulate the system.

3. *Chalybeate Waters*,—are those which contain iron in such quantity as to form one of their leading ingredients. The term chalybeate is derived from the Latin, *chalybs*, signifying "hard iron," or "steel." In these waters the iron is in the state of an oxide, which is by itself insoluble, but it is generally in union with carbonic acid, or sometimes with muriatic or sulphuric acid. When water of this kind is freely exposed to the air, so much of the oxide of iron unites with an additional portion of the oxygen of the air, as to form an insoluble per-oxide of iron. In order to effect this, the oxide quits the acid with which it is united; this is the cause of the brownish or reddish-yellow deposit observed at the sides and bottom of such springs.

Chalybeate waters are known by turning black when mixed with an infusion of galls. Galls and sulphate of iron are two of the ingredients in ink, and this kind of water has an inky astringent taste. The chalybeate springs contain other ingredients besides the carbonate of iron, such as those which are found in saline waters.

The most celebrated chalybeate waters in England are those of Tunbridge, Brighton, and Cheltenham. The waters of Tunbridge have a temperature of about 50°: the supply is not great, and is in some measure dependent on the weather, the smallest supply being about a quart, and the greatest about two and a half gallons, per minute. The effect of these waters is of a stimulating and strengthening character. The other chalybeate springs in England have properties very similar to the above. Dr. Thomson has recently described a spring at Vicar's Brig, in Perthshire, which he considers the strongest chalybeate water in existence. It is four times as strong as the Moffat water, and is too powerful to be drunk without dilution, but is used by the country people to heal cuts and bruises.

At Langen-Schwalbach are three springs, which Sir F. Head describes, and which may be considered as chalybeate, although they contain also much carbonic acid. There are three brunnens,—the Pauline, the Wein, (wine,) and the Stahl, (steel,) which attract visiters in great numbers. Sir F. Head was recommended to take three glasses of the water at six in the morning; to bathe at ten o'clock (taking two more glasses on emerging from the bath); and, finally, three glasses at five in the evening. The water is so thickly impregnated with oxide of iron, that the colour is quite red and muddy, but it imparts a vigour and strength to the system. The bathing dresses which have been frequently immersed in this water, are stained of a deep red colour.

MY MOTHER, I REMEMBER THEE!

Blest mother! I remember thee, from early childhood's hour,
When first my heart awoke to feel maternal love's deep power;
When not a transient tear could dim the smile of infant bliss,
That was not dried beneath the warmth of a mother's fervent kiss.

Ah! yet the prayer I learned to lisp at twilight by the knee,
Is clear upon the deep-wrought page of hallowed memory!
And those soft tones that rose to heaven from out thy swelling breast,
They seem to sound upon my ear, though thou art gone to rest.

Blest mother! I remember thee, from youth's fresh, buoyant day;
A star thou wert to guide my feet, of pure and constant ray:
Thy love possessed a charm beyond the light of pleasure's beams,
And 't was thy counsel that forbade my trust in earthly dreams.

And I remember a soft hand that smoothed my aching head,
A tearful, guardian eye, that watched beside my curtained bed;
The careful step, the soothing draught thy kindness had prepared,
And all the tokens of that love thy orphan child once shared.

Blest mother! I remember thee, as guide, companion, friend!
When years mature had taught my heart life's blessings and their end;
When I had learned to share thy griefs, to shed the tear for thee,
Who in my wayward days had turned to pray and weep for me.

'T was mine to cheer thy widowed heart with all a daughter's love,
And lift thy sinking spirit up to brighter scenes above;
To scatter in thy lonely path the flowers which kindness weaves,
And bind around thy temples fair affection's myrtle leaves.

Blest mother! I remember thee, (alas! how sad the spot
On memory's page, which even now the tear of grief must blot!)
When first the blight of fell disease passed o'er thy constant heart,
And on thy brow, with death's pale hand, 't was written, 'We must part!'

But not a murmur mingled then with faith's assurance given,
And not a fear passed with thee through the darksome vale to heaven;
No! God's own rod and staff were there, nor could I wish thy stay,
When angels beckoned thee from earth, and all its ills away.

Blest mother! I remember thee, when on thy sable bier,
And followed by an orphan train, which stranger hands must rear;
When laid within thy narrow bed, where now the green turf grows,
While we were left alone to stem the tide of human woes.

Yet not *alone*, for One there is, our Father in the sky,
Who stoops to make our cause his own, who listens to our cry;
Upon his arm our strength was stayed, his hand hath been our guide,
And He who gives the ravens food, for us will still provide.

Blest mother! now I think of thee, as one amid that throng
Who chant before the throne of God 'their everlasting song;'
In midnight dreams thy angel form around my couch appears,
And oft thy hand seems stretched again, to wipe away my tears.

When gazing at the shining stars, their fixed and holy light
Recalls thine own unwavering faith, and thy example bright;
And in the firmament of heaven, a star thou 'lt ever shine,
With beams more beautiful and bright—a lustre all divine.

E. C. S.

ENGLAND IN THE OLDEN TIME.

No. IV.

Games with a Ball.

There are but few exercises more delightful and invigorating than games played with a ball in the open air. Every muscle is exerted,—the eye is accurately directed towards a particular spot,—and the attention of all the players is fully roused. Unlike many other games, it is seldom that wrangling or churlish feelings are engendered by the course of the sport; and there can be no doubt that the physical powers are strengthened by the exercise.

One of the earliest kinds of ball-play was, in all probability, that of *catch-ball*, in which two or more players toss a ball alternately from one to another: this requires but little bodily exertion, and used to be practised by females as well as by males.

When the ball, instead of being merely tossed from one to another, is struck, we enter upon a great variety of games, which have, in one form or other, lasted to the present day. A game of this kind, called *palm-play*, used to be practised in France. This exercise consisted in receiving a ball thrown by another player, and driving it back again with the palm of the hand. In former times they played with the naked hand, then with a glove, which in some instances was lined: afterwards they bound cords and tendons round their hands to make the ball rebound more forcibly; hence probably was the idea of *racket* obtained.

In the sixteenth century tennis-courts were common in England, and their establishment countenanced by the example of the monarchs. Henry the Seventh was a tennis player; for in a MS. register of his expenditures made in the thirteenth year of his reign, and preserved in the Remembrancer's Office, this entry occurs:—"Item, for the king's loss at tennis, twelvepence; for the loss of balls, threepence." His son, Henry the Eighth, was, in the early part of his reign, also much attached to this diversion. This propensity, to use the words of Hall, "being perceived by certain craftie persons about him, they brought in Frenchmen and Lombards to make wagers with hym, and so he lost muche money; but when he perceyved theyr crafte, he eschued the company and let them go." The game seems to have consisted in this: a line was stretched across the middle of the court, and the players, standing on either side with their rackets ready to receive the ball, endeavoured to strike it so as to go over the dividing line.

Fives, or hand-tennis, seems to have derived its name from the number of competitors on each side. In 1591, when Queen Elizabeth was entertained at Elvetham in Hampshire, by the Earl of Hertford,—

> After dinner, about three o'clock, ten of his lordship's servants, all Somersetshire men, in a square greene court before her majesties windowe did hang up lines, squaring out the forme of a tennis-court, and making a cross line in the middle; in this square they (being stripped out of their dublets) played five to five with hand-ball and cord as they tearme it, to the great liking of her highness.

Balloon-ball, or *wind-ball*, was a game formerly played. This was a large ball made of leather and filled with air. It was struck by the hand, or by a bracer of wood which covered the hand and the lower part of the arm.

Stool-ball was a game which Strutt thus describes:

> I have been informed that a pastime called *stool-ball* is practised to this day in the northern parts of England, which consists in simply setting a stool upon the ground, and one of the players takes his place before it, while his antagonist, standing at a distance, tosses the ball with the intention of striking the stool; and this it is the business of the former to prevent by beating it away with the hand, reckoning one to the game for every stroke of the ball; if, on the contrary, it should be missed by the hand and touch the stool, the players change places. I believe the same also happens if the person who threw the ball can catch and retain it when driven back, before it reaches the ground. The conqueror at this game is he who strikes the ball most times before it touches the stool. Again, in other parts of the country, a certain number of stools are set up in a circular form, and at a distance from each other, and every one of them is occupied by a single player; when the ball is struck, which is done, as before, with the hand, every one of them is obliged to alter his situation, running in succession from stool to stool, and if he who threw the ball can regain it in time to strike any one of the players, before the latter reaches the stool to which he is running, he takes his place, and the person touched must throw the ball, until he can, in like manner, return to the circle.

This differs but very little from the game of *rounders*, which is much played at the present day in the west of England.

Trap-ball, as it was formerly played, differed from the plan pursued at the present day. The annexed engraving represents the form of the trap, taken from a MS. of the fourteenth century. There seems to be

this advantage in the old method over the modern one, that the player need not stoop to strike the trap, since it is elevated considerably from the ground. Rustics have a mode of preparing a rude trap, by making a round hole in the ground, and, by way of a lever, place a flat piece of wood in an inclined position, one half in the hole with the ball upon it, and the other half out of it: the elevated end being struck smartly with the bat, occasions the ball to rise to a considerable height, and all the purposes of a trap are thus answered.

It is usual in playing the game, to place two boundaries at a given distance from the trap, between which it is necessary for the ball to pass when it is struck by the batsman, for if it falls withoutside of either, he gives up his bat and is out; he is also out if he strikes his ball into the air, and it is caught by one of his adversaries before it grounds; and again, if the ball, when returned by the opponent party, touches the trap, or rests within one bat's length of it: on the contrary, if none of these things happen, every stroke tells for one towards the striker's game. In Essex the game is frequently played with a stout round cudgel, instead of a bat, which renders the striking of the ball more difficult. When the player has struck his ball, he calls aloud for a certain number, one or more, of *scores*, the object of which is as follows:—the opposing party bowls or throws the ball towards the trap; when the ball stops, the distance from it to the trap is measured in

cudgels' lengths; if the number of these lengths equals or exceeds the score called for by the player, he adds those scores towards his game; but if they are less, the player is out. This is an excellent feature in the game, because the player regulates the number of *scores* for which he calls out, by his estimate of his opponent's skill in sending the ball near the trap.

There is another game called *tip-cat*, in which a small piece of wood, called the *cat*, answers the purpose of both ball and trap. It is about six inches long and two inches diameter at the middle, from whence it tapers off to a point at each end, presenting the appearance of a double cone. When this cat is laid on the ground, a blow of the bat at either side of the centre will send it spinning up into the air; it is then struck with the bat, as at trap-ball, and any regulations as to the mode of playing the game may be adopted at pleasure.

There were numerous games under the names of *foot-ball*, *bandy-ball*, *goff*, *club-ball*, *pall-mall*, &c., in which a ball was struck from one place to another; but it is not necessary to describe them all separately, since two or three of them were very similar. Goff is frequently played at present in the following manner. It is performed with a straight bat, usually made of ash, about four feet and a half in length, and curved at the bottom. The ball is small, but exceedingly hard. There are generally two players, each of whom has his bat and ball. The game consists in driving the ball into certain holes made in the ground, he who achieves it the soonest, or in the smallest number of strokes, obtains the victory. The goff-lengths, or the spaces between the first and last holes, are sometimes extended to the distance of two or three miles; the number of intervening holes appears to be optional, but the balls must be struck into the holes, but not beyond them. When four persons play, two of them are sometimes partners, and have but one ball, which they strike alternately, but every man has his own bat.

Goff, and another game very similar to it, called *pall-mall*, were favourite games among the nobility in the seventeenth century. In the latter game a ball was struck with a mallet or bat through a high arch of iron, and the game was won by the player who could do it with the fewest blows. Charles the Second and his courtiers were in the habit of indulging in this sport in the walk in St. James's Park, which took the name of *mall* from this circumstance; it is also probable that the street which runs parallel to that walk acquired the name of Pall-Mall from the same circumstance. The name was originally Pale-Maille.

The game of *ring-ball* was played as follows. A long alley or playground was selected, and a ring was fastened into the ground at an equal distance from the sides of the alley, but much nearer to the top than to the bottom of the ground, and through this ring it was necessary for the ball to be passed in its progress. The ring was made to turn with great facility upon a swivel, and the two flat sides were distinguished from each other. If the ball passed through the one, it was said to be lawful and the player went on; but if through the other, it was declared to be unlawful, and he was obliged to beat the ball back until such time as he caused it to pass on the lawful side; this done, he proceeded to the bottom of the ground, where there was an arch of iron through which it was also necessary for the ball to be passed, and then the game terminated:—he who executed his task with the smallest number of blows to the ball, won the game. Our second figure, taken from a MS. of the thirteenth century, represents a man playing at *club-ball*, which probably did not differ much from *ring-ball*.

There is a Cornish game called *hurling*, which is attended with much excitement and bodily exertion by the players. Carew, who wrote a *Survey of Cornwall*, more than two centuries ago, thus describes this game:—

Hurling taketh his denomination from throwing of the ball, and is of two sorts,—in the east parts of Cornwall to *goales*, and in the west to the *country*. For hurling to *goales*, there are fifteen, twenty, or thirty players, more or less, chosen out on each side, who strip themselves to their slightest apparel, and then join hands in ranke one against another. Out of these rankes they match themselves by payres, one embracing another, and so passe away, every of which couple are especially to watch one another during the play; after this they pitch two bushes in the ground, some eight or ten feet asunder, and directly against them, ten or twelve score paces off, other twain in like distance, which they terme *goales*, where some indifferent person throweth up a ball, the which whosoever can catch and carry through his adversaries goale, hath wonne the game. But herein consisteth one of Hercules his labours, for he that is once possessed of the ball, hath his contrary mate waiting at inches and essaying to lay hold upon him, the other thrusteth him in the breast with his closed fist to keep him off, which they call *butting*. For hurling to the *country*, two, three, or more parishes, agree to hurl against two or three other parishes. The matches are usually made by gentlemen, and their goales are either these gentlemen's houses, or some towns or villages three or four miles asunder, of which either side maketh choice after the nearnesse of their dwellings. When they meet there is neyther comparing of numbers nor matching of men, but a silver ball is cast up, and that company which can catch and carry it by force or sleight to the place assigned, gaineth the ball and the victory. Such as see where the ball is played, give notice, crying "ware east," "ware west," as the same is carried. The hurlers take their next way over hilles, dales, hedges, ditches; yea, and thorow bushes, briars, mires, plashes, and rivers whatsoever, so as you shall sometimes see twenty or thirty lie tugging together in the water, scrambling and scratching for the ball.

Strutt says, that at about the year 1775, parties of Irishmen used to meet in the fields at the back of the British Museum (now occupied by Montague Place, &c.) and play at hurling to goals. Instead of throwing the ball with the hand, they employed for that purpose a kind of bat, which was flat on both sides and curved at the end.

Foot-ball is played by two parties, consisting of an equal number of competitors, who take the field, and stand between two goals, placed at a distance of eighty or a hundred yards from each other. The goal is usually made with two sticks driven into the ground, about two or three feet apart. The ball,

which consists usually of a horse's bladder blown and cased with leather, is thrown into the midst of the ground, and the object of each party is to drive it through the goal of their antagonists, which being achieved, the game is won. The abilities of the players are best displayed in the attack and defence of the goals: sometimes when the players become excited, they so far lose sight of friendly feelings as to commence kicking each other's shins, in contesting at the goals.

Of the noble game of *cricket* we need say but little, partly because it is so universally known, wherever a free patch of green-sward is to be met with, and partly because it is our object to describe those games which were more in vogue in "the olden time" than at present. Cricket was probably never more prevalent in England than at the present day.

There are other ball-games which our younger readers will easily call to mind, but we cannot here devote space to them, for the reasons just assigned with reference to cricket.

STRUGGLE BETWEEN AN EAGLE AND A SALMON.

THAT the eagle is extremely destructive to fish, and particularly so to salmon, many circumstances would prove. Eagles are constantly discovered watching the fords in the spawning season, and are seen to seize and carry off the fish. Some years since, a herdsman, on a very sultry day in July, while looking for a missing sheep, observed an eagle posted on a bank that overhung a pool. Presently the bird stooped and seized a salmon, and a violent struggle ensued; when the herdsman reached the spot, he found the eagle pulled under water by the strength of the fish; and the calmness of the day, joined to his drenched plumage, rendered him unable to extricate himself. With a stone the peasant broke the eagle's pinion, and actually secured the spoiler and his victim, for he found the salmon dying in his grasp.

When shooting on Lord Sligo's mountains, near the Killeries, a gentleman says he heard many particulars of the eagle's habits and history from a gray-haired peasant who had passed a long life in these wilds. The scarcity of hares, which here were once abundant, he attributed to the rapacity of those birds; and he affirmed, that when in pursuit of these animals, the eagles evinced a degree of intelligence that appeared extraordinary. They coursed the hares, he said, with great judgment, and certain success; one bird was the active follower, while the other remained in reserve, at the distance of forty or fifty yards. If the hare, by a sudden turn, freed himself from his most pressing enemy, the second bird instantly took up the chase, and thus prevented the victim from having a moment's respite. He had remarked the eagles also while they were engaged in fishing. They chose a small ford upon the rivulet which connects Glencullen with Glandullah, and posted on either side, waited patiently for the salmon to pass over. Their watch was never fruitless—and many a salmon, in its transit from the sea to the lake, was transferred from its native element to the wild aëry in the Alpine cliff that beetles over the romantic waters of Glencullen.—?

THE burning sands of hot climates, even at Carsfield, at the Cape of Good Hope, which are so arid and scorched that no water can be extracted from them, are the soil in which the most succulent vegetables of which we have any knowledge flourish. So deleterious, indeed, is a wet season to their growth, that they are destroyed by it. There are also various tribes of vegetables that are destitute of roots, and which can only be supported and nourished by the air, and the moisture which it contains. It is stated that the aërial Epidendron, (*Epidendron flos aëris,*) which is a native of Java, is plucked up by the inhabitants, on account of the elegance of its leaves, the beauty of its flowers, and the exquisite odour it diffuses, and suspended by a silken cord from the ceiling of their apartments, where it continues from year to year to put forth new leaves, to display new blossoms, and exhale new fragrance, though fed only by the air.—?

ON ECHOES. II.

THE brief outline which we have given of the nature and cause of Echoes, will, we hope, enable our readers to understand the reason why Echoes are so different in their character and frequency, according to the circumstances under which they are produced.

If a person standing in a narrow passage, were to throw a ball forcibly against the wall, it would rebound against the opposite wall, be again reflected from thence, and perhaps a third and a fourth time, be reflected from side to side before it fell to the ground. The number of times that these rebounds would occur, would depend on two circumstances: first, the width of the passage; and second, the force with which the ball is thrown: of the truth of this any one can easily convince himself by experiment. Again, if a schoolboy strikes his marble against the side of a stone, and there be another projecting stone opposite to the first, the marble will rebound from one surface to the other and back again, and this would occur perhaps several times.

Now exactly the same thing would occur, if there were a perpendicular wall, or rock, *behind* a person who utters a sound as well as one *before* him: the sound of his voice would be reflected from one surface (in the manner which we illustrated by reference to a racket-ball), and travelling backwards, would strike against the opposite surface, situated behind him, from which, being reflected again, it would once more travel to the opposite wall, and so on until the sound became too weak to travel further. In every backward journey it would strike upon the ear of the speaker, and as many Echoes as he could appreciate separately, so many times has the sound travelled to and fro.

This then is the cause of the oft-repeated Echoes which are heard of in different parts of the world. The two opposite walls of a building, or two perpendicular rocks, one on each side of a ravine or mountain-pass, or two lofty buildings separated by a wide space, may all, if they be parallel to each other, become the home of Echo: a sound will be reflected from one to the other: and if the surfaces be exactly opposite to each other, the reflexions will be numerous: and, as Dr. Arnott observes, a sound produced between them is repeated often, "playing like a shuttlecock between them, but becoming more faint each time, until it is heard no more. In some situations, particularly when the sound plays thus above the smooth surface of water, a pistol-shot may be counted forty times."

Addison mentions an Echo near Milan which will return the sound of a pistol, fifty-six times.

Lord Bacon describes an Echo in the church of Pont-Charenton, on the River Seine, in which he discovered the inability of an Echo to return the letter S, for having pronounced the word SATAN, the Echo replied VA-T-EN, which in French means "Be off" or "Go away." From this circumstance the French priests concluded that some protecting angel prevented the walls of the sacred building from pronouncing the name of *Satan.*

The Rev. Gilbert White, in his *Natural History of Selborne,* has devoted one of his charming letters (the 34th.) to a description of an Echo at Selborne, in which however there is nothing remarkable, except in the manner in which it is treated.

On the banks of the Rhine, near Lurley, there is a remarkable Echo, produced by the singular disposition of the two elevated banks of the river following parallel lines in a serpentine direction, and thus presenting many reflecting surfaces to the rays of sound. When travellers pass near this spot it is usual for the postilions to sound their horns. The musical sounds

are soon repeated clearly and distinctly, and again a second, a third, and even a fourth time, as if from a progressively-increasing distance, until they fade away. When this experiment is performed in a boat placed midway between the two banks, the repetitions of the sound are more numerous.

There is a legend connected with this Echo, at which, we are happy to say, the correct views of modern science, and its salutary effects on the mind, now enable us to smile. The legend informs us "that a beautiful nymph resided on the rock of Lurley, which overshadows a dangerous eddy; and often when the amazed boatmen sailed through the stream, listening to the mysterious voices around him, his bark was drawn within the Vortex, and he was left to perish under the dwelling of the siren. The reports of her beauty and the cruelty of her disposition, attracted the attention of the youthful son of the Count Palatine of a neighbouring country; and he determined on seeing her, and carrying her captive to his father's court. But his fate was sad; for on arriving, escorted by a few followers, in the troubled waters of Lurley, his boat whirled round and disappeared. Grieved at the loss of his son, the Count sent a small band to seize the relentless damsel, and they were about to do so; when a sudden hurricane swelled the stream, the waves crested with foam, rose to the top of the rock," and encompassing the lovely Undine *, saved her from the rude grasp of man, and carried her to the realm of her fathers. Her voice is still heard, returning the sounds of sadness and of mirth, but her form is no longer seen on the rocks of Lurley."

These instances are sufficiently interesting; but a remarkable addition to the effect of Echo is produced, when the surface from which the reflection occurs is concave or hollow. Here again we shall find a racket-ball useful as an illustration:—suppose a room, or a piece of ground, were perfectly circular, and surrounded by a high wall; if two players were within the space, and one of them occupied exactly the centre, wherever the latter one struck the ball, it would invariably return to him again; whichever part of the wall he directed the ball to, he would always fail in making it rebound to his companion (except when he made the ball pass over the head of the latter towards the wall), and the latter would find himself deprived of his share of play. The reason of this is, that no part of the wall slopes away from the person who occupies the centre of the room, as every part of it is equally distant from him (that being one of the properties of every circle).

If now, instead of a ball, the sound of his voice were the object reflected from the circular wall, all the reflection would return exactly to the spot occupied by him; and the multiplicity of these reflections or Echoes, would produce an extraordinary loudness of sound to his ear. But any other person in the room would be in the condition of the inactive racket-player, he would to be sure hear the sound of his neighbour's voice coming direct to him, but he would not hear one of the Echoes. Were it possible for the floor and ceiling of a room to be constructed as a hollow globe, that is, equally concave above, around, and below; a person placed in the centre would hear his own voice with most stunning effect, as an Echo would come from every conceivable point of the surface.

The shape of an egg is familiar to all our readers, and it is easy to conceive a flat surface, having the same shape as the outline of the egg: this is called an oval, or elliptical surface, and may be considered as a circle flattened on two of its sides. Many of our young friends are doubtless acquainted with the mode of forming an oval from pieces of two different-sized circles; and that, as well as simple inspection will show, the centre of the oval is not equi-disant from every part of the boundary. If, therefore, a room were of an oval shape, and a person standing in the middle were to throw a ball against the wall, it would not rebound to the spot occupied by him, except from the two points nearest, and the two points farthest from him; if he cast the ball in any other direction, it would rebound to some other part of the oval space. But it is remarkable, that a perfect oval contains two spots, both of which possess many of the properties which belong only to one centre. If two persons were standing, one on each spot, and one of them were to strike the ball, it would invariably rebound towards the other player: by no method of throwing the ball could he make it rebound to himself again, except from two points; viz., the one nearest to, and the one farthest from himself.

Let us now, as before, apply this reasoning to the reflection of sound. If the person situate at one of those favoured spots were to produce a sound, instead of throwing a ball; the Echoes would all congregate togards the other spot, while he himself would hear none of them. This singular effect of concentration after reflection would be beautifully shown, if we had an oval room, the wall of which was covered with looking-glass or polished metal. If a candle were placed in one of those centres, all the reflections, except two, of its light would assemble together at the other centre, so that a great brilliancy would be caused at that point, while the person who held the candle would see but two images of it in the polished surface. It is from this circumstance that the two centres have acquired the name of *foci*, (or fire-places,) because wherever an accumulation of light exists, great heat exists also. In proportion as the oval approaches to a circular form, the two foci are nearer to each other; but if it be a *long* oval, they are further asunder, and approach nearest to the small ends of the oval.

If our readers have been able to follow this brief description of the mode in which Echoes accumulate, where the reflection takes place at a curved surface, they will be at no loss to understand the cause of some remarkable instances of Echo, which we shall adduce. There are on each side of Westminster Bridge several arched recesses, (intended as resting-places,) and placed exactly opposite to each other, two and two. If in the stilly calmness of night, two persons place themselves in two opposite recesses (one in each), with their backs towards each other, and one of them whispers, the other will hear distinctly what he says. We may, without much impropriety, call those two recesses the two small ends of an oval, and that the whisperer is situated in one focus, and the listener in the other focus of that oval, and that the multiplied reflection produces a sound as loud as if the listener's ear were close to the speaker.

Great as this distance seems to be, it is much less than the diameter of the dome of St. Paul's, and yet a whisper uttered in the interior gallery of that stupendous dome is distinctly audible at the other side: this is due to two circumstances,—1st, the whisper is reflected from side to side, and,—2nd, it is carried round the circular wall, and, therefore, not dissipated as it would be in the open air; for it is desirable here to observe, that if sound be prevented from spreading in one direction it will appear more

* A German term for a sea-nymph, or water-nymph. There is a wild and beautiful tale, well known to the German Student, entitled "*Undine*," written by the Baron de la Motte Fouqué.

intense in another direction. Acting upon this principle, (although it is very doubtful whether he could explain the cause of it,) the itinerant dealer in the public streets holds his open hand at the side of his mouth, while calling his wares for sale, in order that by acting as a wall it may carry the sound in any particular direction.

Mention is made of a clergyman in the country, who caused a concave surface, or sounding-board, to be placed behind him, in order that the sound of his voice might, after reflection from that surface, be carried to the remote end of his church; it was found, however, that his position in the pulpit was in the *focus* of that curved surface, and that the echoes returned to his own ear with a stunning effect, and it was found necessary to remove the sounding-board.

Mention has been made more than once, of situations where the noise produced by a waterfall has been concentrated by the concave surface of a neighbouring cave, that a person accidentally bringing his ear into the focus, is suddenly astonished at the tremendous and apparently unaccountable roar of many waters. It is not an uncommon trick to place a chair in the cave in the focus, so as to invite the wearied stranger, who often exchanges his fatigue for perplexed astonishment.

The expanded sail of a ship, made concave by a gentle breeze, is often a good condenser of sound. It is related by Dr. Arnott, that a ship sailing along the coast of Brazil, far out of sight of land, the persons walking on deck, when passing a particular spot, heard very distinctly, during an hour or two, the sound of bells, varying as in human rejoicings. All on board came to listen, and were convinced, but the phenomenon was most mysterious. Months afterwards it was ascertained, that at the time of observation, the bells of the city of St. Salvador, on the Brazilian coast, had been ringing on the occasion of a festival; their sound, therefore, favoured by a gentle wind, had travelled over perhaps 100 miles of smooth water, and had been brought to a focus by the concave sail in the particular situation on the deck when it was listened to.

Before concluding, we may mention that Echoes will enable us to ascertain, with tolerable accuracy, the distance of an echoing surface from the person who produces the sound.

We have before stated, that sound travels at the rate of 1125 feet per second; if, therefore, a person utters a sound, and he hears its echo one second of time after the sound is produced, he will know that the sound has travelled 1125 feet, that is 562½ to the echoing surface, and the same distanee back again.

The greatest number of distinct sounds that the ear can appreciate in one second, is about ten or twelve; beyond that number, they all seem to blend into one. If, therefore, a person were to utter ten syllables, or produce ten notes on a musical instrument in a second, and he could hear the Echo of the whole of these ten, he would know that the Echoing surface is not less than 562½ feet from him: but if the Echo of the first notes reached him while he was producing the sixth, that would indicate a distance of only 281¼ feet, the half of the former. If the Echo of a single sound returned to him about 2½ seconds after the sound was uttered, he would be able to calculate that the Echoing surface was about half a mile distant, and so of any other interval.

When Echoes are distinctly audible, it will generally be found that the distance between the reflecting surface and the ear of the observer, is not less than seventy or eighty feet; so that the sound, before it *returns to* the ear, travels not less than 140 or 160 feet. Echoes are constantly occuring in all our apartments, and the reason that we do not hear them is, that as sound travels so quickly, it allows no appreciable interval of time between its motion from the mouth to the walls, and back again to the ear of the speaker, so that the original sound and its Echo become so blended as to appear only one sound. In very large rooms however, such as music-rooms, the separation of the original, and of the reflected sound, is often painfully evident. The best remedy appears to be to break the surface by mouldings and ornaments of various kinds.

The reason why thunder sometimes produces a sudden violent shock, and at other times, a rolling rumbling sound, is that in the latter case the original noise is echoed from cloud to cloud, and from cloud to earth, and that if large masses of cloud be situated at different distances from the hearer, he will hear a rapid succession of Echoes, those reaching him first which have the shortest distance to travel, and thus a lengthened sound is heard instead of a short and sudden sound.

It were much to be wished, that the timorous and superstitious feeling with which thunder is often regarded by the uneducated, were replaced by a more just, and cheerful tone of mind. Neither pure religion, nor a common course of reasoning, will justify the terror and mental dread so often experienced on the occasion. It should be regarded as one of those grand and sublime manifestations of the system by which the great Architect governs the worlds which he has created, and not merely as a means of striking terror into the hearts of his creatures. There is an inward monitor more powerful than thunder, which can better perform that office when necessary.

T.

THE laugh of the hyena greatly resembles that of a maniac, and has a startling effect as it steals through the still night, even under our windows, which it approaches in search of food. The power of imitation given to these animals is very extraordinary; for they not only cry like the quadruped whom they wish to lure within their reach, but they even seem to utter human sounds. The commandant of a fortress on the western coast of Africa assured a lady, that for several evenings he had been disturbed at his dinner-hour by the laughing and screaming of the native women, who passed under the walls in search of water. He sent his serjeant to them, who desired that they might take some other path, and they promised to obey. The next evening, however, the noise was heard again, which highly irritated the commandant, and he desired the serjeant to lie in ambush on the third evening, and rushing suddenly out on them, with a few soldiers, secure the women, and bring them to him in the fortress. The men took their station as ordered, the laughing recommenced, and out they sallied, when to their great astonishment, they only saw three hyenas standing in the path which had been frequented by the women, and so well counterfeiting their voices, that they could not have been detected but by sight. These hyenas are not very formidable, and will, at any time, rather fly from, than attack a human being.

This species of the hyena are very common in American menageries, but they are so subdued and powerless, from constant confinement, and so fearfully watchful of the keeper's eye, that they never manifest, as prisoners, any of the peculiar imitative sounds which characterize them in their native regions.

WHEN the garden in the rising year begins to array itself in gold and purple—in youthful brilliancy, all nature joins in the scene of gladness. 'Twere ungrateful then for a man to stand alone in sullen apathy.—MAUND.

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STRASBOURG ON THE RHINE. No. II.

VIEW IN STRASBOURG.

e concluded our last article with a notice of the thedral of Strasbourg; let us now proceed to the urch of St. Thomas, in which the most conspicuous ject of curiosity is an elaborate monument to the emory of Marshal Saxe:—it was the most cele- ated production of Pegalle, and was erected at the pense of Louis the Fifteenth of France. Marshal xe was a great general, though rather a dissipated an, and his sovereign erected this monument,—not the man,—but to the general. The background of e monument is a broad, tall pyramid of grey arble, built against the wall of the church. The ramid terminates below in a few steps, on the west of which is a sarcophagus. The marshal is presented in the act of descending the steps towards e tomb. On the right the symbolical animals of ngland, Austria, and Holland, are flying from him dismay; on the left, the banner of France is ating in triumph. The warrior's eye is fixed with expression of tranquil contempt on a figure of eath standing below, thrusting out his raw head and ny arms from beneath a shroud. This figure is lding up to the marshal, in one hand, an hour- ass, in which the sand has run out, and with the her, is opening the sarcophagus to receive him. A female figure, representing France, throws herself between them, exerting herself at once to hold back the Marshal, and to thrust away death. On one side of the whole, a genius weeps over an inverted torch; and on the other is Hercules leaning on his club. The whole of these figures are as large as life, and are cut in marble.

The Town Hall is a large and noble structure, and has its façade ornamented with antique paintings. The edifices devoted to commercial purposes, though not elegant, are numerous and convenient, and fitted for the commerce of the town, which comprehends the usual description of imports, and the following exports:—corn, flax, hemp, wine, spirit, linen, sail-cloth, blankets, carpets, hardware, leather, cotton, lace, tobacco, snuff, &c.

The Protestant academy is one of the best of that class in France: as a place of instruction it may rival the most celebrated in Germany. It possesses a good collection of philosophical instruments, and a museum of comparative anatomy, in which all the articles are arranged according to the most approved scientific method. There is a chemical laboratory, and a valuable collection of objects in different branches of natural history. Each faculty in the

academyhas a separate library; but there are, besides, wo other libraries, one belonging to the observatory, and the other open to the public. The last-mentioned library contains 55,000 volumes; and as a relic of an honoured townsman, it is made the repository of the sword of General Kléber, and of the stiletto of his assassin.

The Medical School of Strasbourg, after being long an academy, was constituted an university in the seventeenth century. It was curtailed in the number and importance of its classes at the time of the French Revolution, but was replaced on its former footing in 1803. It was in the same year also that the Protestant University was established.

The once Royal Castle of Strasbourg, when Alsace was a province of political importance, is now the residence of the bishop.

There are perhaps few feelings more generally diffused than an affectionate regard from the inhabitants of a particular town, towards any native of that place who may have raised himself in reputation for great or good actions. The truth seems to be, that the inhabitants feel as if part of the honour which devolves on the man, belongs to the town which gave him birth; and they feel proud in owning him as a brother townsman. Vanity may have something to do with this, but it is unquestionable that it is a kindly and praiseworthy feeling.

Strasbourg is not behind other cities in this respect. An obelisk to the memory of General Kléber is erected on a piece of ground near the town, at present a place for the exercise of artillery. Jean Baptiste Kléber was born at Strasbourg, in 1754. His father was a common labourer, and young Kléber was himself peacefully occupied as an architect, when the political events of the day turned his attention to a military life. From 1776 to 1783 he served in the Austrian army, against the Turks. Having entered as a simple grenadier, in a French volunteer corps, in 1792, his talents soon procured him notice; and, after the capture of Mayence, he was made General of Brigade. It is to the credit of Kléber, that although he continued to serve in the French army, he openly disapproved of the atrocities which were too often witnessed at Paris. He joined Napoleon in the Egyptian expedition, and so distinguished himself, that when Napoleon returned to Europe, he left Kléber in command of the French army. Here he had to contend against countless difficulties, and at last fell a victim to the stiletto of a Turkish assassin, on the 14th of June, 1800. The Strasbourgers, proud of the man who had raised himself from the rank of a peasant to that of commander of an army, erected an obelisk to the memory of their townsman.

There is also an obelisk to the memory of General Desaix, which rises behind the citadel, on an island opposite the village of Kehl. This spot seems to have been selected from the circumstance that in November, 1796, he greatly distinguished himself by his defence of the bridge at Kehl, while serving under Moreau, in the army of the Rhine.

Another distinguished native of Strasbourg, was General Kellerman, who was born there in 1735. He was a general in the French army, and one of the few who survived the eventful period of the revolution; and, when he died in 1820, ordered his heart to be buried on the field of Valmy, where he had greatly distinguished himself twenty-eight years before.

If we quit the arena of warfare, and enter upon the more tranquil and pleasing subject of mental improvement, we find Strasbourg to be distinguished as the first place in which the art of printing was carried on with moveable types. John Gutenberg, whose real name was Henne Gaüsefleisch von Sorgenloch, was born in 1396 at a small village near Mentz. When a young man, he became implicated in an insurrection of the citizens of Mentz against the nobility, and he was forced to flee to Strasbourg. In 1436 he entered into a contract with Andrew Dreizehn, and others, binding himself to teach them certain secret arts, and to employ them for their common advantage. The death of Dreizehn, which happened soon after, frustrated the proceedings of the company, which is supposed to have had reference to the art of printing. Gutenberg became involved in lawsuits, but at last succeeded, in partnership with Faust, a rich citizen of Mentz, in putting his noble discovery into execution. But an interested party opposed itself to his progress, and succeeded in driving him from the town in exile, —a fate which too much resembles that of many other benefactors of mankind. Posterity has acknowledged his merits by erecting, in 1837, a splendid monument to his memory at Mentz.

The management of the Charitable Institutions, as well as prison discipline, at Strasbourg, is said to be highly creditable to the good sense and good feeling of the inhabitants, and worthy of the imitation of other towns.

There is perhaps no town either in France or in Germany, in which the manners, customs, and languages of both nations are more mingled together than at Strasbourg. There are many reasons for this. Strasbourg is the most eastern town in France, and is only separated from Germany by the width of the Rhine; the common intercourse of persons on the opposite sides of a river, for the purposes of commerce, would alone be sufficient to occasion a considerable admixture of customs in the place. But there are other circumstances tending to the same point. Strasbourg is altogether a German name, and the town formed a part of Germany for many centuries,—hence its German associations. On the other hand it has formed part of the territory of France for the last hundred and fifty years, and therefore has necessarily imbibed a large share of French manners. It appears, in this, as in many similar instances, that the wealthier part of the inhabitants adopt the modes and speak the language of the court to which they belong, while the humbler classes adhere, to a considerable extent, to the language and manners of their forefathers. This seems to be the case in Strasbourg: the educated inhabitants speak French, while the more simple and humble adhere to their original German.

The same mixture of two nations is visible in the diet and modes of cooking. Mr. Russell, speaking from a personal visit to Strasbourg, thus remarks on this subject:—"At Strasbourg you may dine on dishes as impenetrably disguised, or languish over *entremets* as nearly refined away to nothing, as at the tables of the great Parisian rivals, Very and Vegours; or, on the other side of the street, for half the money, you may have German fat, plain boiled beef, and some cabbage. The German kitchen is essentially a plain, solid, greasy kitchen: it has often by far too much of the last quality. People of rank, indeed, in the great capitals, are as mad on French cookery, as the most delicate of their equals in London; but the national cookery, in its general character, is the very reverse of that of France; and it is by no means certain that the national cookery of a people may not have some connexion with its national character. The German justly prides himself on the total absence of parade, on the openness, plainness and sincerity which marks his character; accordingly he boils his

beef, and roasts his mutton and fowls just as they come from the hands of the butcher and poulterer."

If we wish to become acquainted with the national style of dress of a particular people, we shall do wrong to go to their capitals, or their chief cities; because there is a very general tendency among the wealthy of one town to copy the style of dress of those in another. It is in the villages and sequestered places that the really national costume may be expected to reside. In describing the dress of the Strasbourgers, therefore, it will be better to go a little out of the town, and take our models from the inhabitants of the villages between Strasbourg and Haguenau. They go to mass or to the Reformed Church, in their best dresses. A square black coat is purposely left open to show a red waistcoat, with gilt buttons. Loose boots made of soft leather, or long gaiters, are attached to black rateen breeches. A broad hat completes the costume. The dress of the women has been thought to be more graceful; it is certainly more showy. The hat does not conceal flowing ringlets, or ribbons of various colours, but the latter are worn only by the young, and never by married women. Long gilt pins serve to fasten the hair, and rise in the form of a coronet. A black silk handkerchief covers the neck, and the bodice is adorned with many ornaments. Broad sleeves of white linen descend to the waist.

THE RAPIDS OF THE ST. LAWRENCE.

In the various modes of water-conveyance to which the traveller on this globe is subjected, there is perhaps no one more curious than that of descending one of the great rapids of America, in a small bark canoe, under the command, as is customary, of two Indians; and the anxiety to witness this spectacle is perhaps not at all disagreeably spiced by that still, warning voice of reason, which gravely admonishes the traveller that his undertaking, interesting as it may be, is not altogether divested of danger.

Besides the rocks, shoals, and snags, which are to be avoided, unceasing attention must be given to the innumerable logs of hewn timber, which, having been wafted by the lumberers to the commencement of the rapid, are then left to be hurried for eight or nine miles towards their market—sometimes separately, sometimes hustling each other, sometimes floundering, and sometimes, if anything irritates or obstructs their passage, rearing up in the water, until they almost reel over. As soon as a berth or clear place is observed between these masses of floating timber, the elder Indian, who is seated at the head of the canoe, his younger comrade being at the stern, and the passenger in the middle, calmly lets go his hold of the bank, and the two Indians, each furnished with a single paddle, immediately standing up, the frail band-box which contains them indolently floats until it reaches the edge or crest of the rapid—which is no sooner passed, than the truth rushes upon the mind of the traveller, that all possibility of stopping has ceased, and that this "hubble-bubble, toil and trouble" must continue until the eight or nine miles of the rapids shall be passed.

In the apparent turmoil of the scene, in which the canoe is preceded, as well as followed, by masses of huge timber, the slightest touch of which would annihilate it—the icy-cold judgment of the old Indian—his collected but lightning-like decision—the simplicity and tranquillity of his red, beardless face, thatched over with his bluff-cut, black, lank hair—his total absence of fear or bravado—his immutable presence of mind—and, in places of the greatest possible noise and confusion in the waters, the mild tone of voice with which he softly utters to his young comrade the monosyllable that directs him to steer the stern of the canoe in the direction opposite to that which he gives to its head—form altogether a most striking contrast with the boisterous scene, the sudden kaleidoscope changes of which it is utterly impossible to describe; for one danger has been no sooner avoided than, instead of reflecting upon it for a moment, the eye is attracted to a second, as suddenly passed and succeeded by a third. Sometimes the canoe rapidly dashes over a sunken rock, or between two barely covered fragments, which to have touched would have been ruin; in avoiding these a snag is passed, which would have spitted the canoe had it impinged on it; sometimes the middle of the stream is the safest; sometimes the Indian steers close to the steep, rocky bank, where it becomes evident the velocity of the current is so great, that if the canoe were to be upset, its passengers, even if they could snatch hold of the bough of a tree, could not hang on to it, without being suffocated by the resistance which in that position they would offer to the rushing waters. Sometimes, at a moment when all is apparently prosperous, and the water, on account of its greater depth or breadth, has become comparatively tranquil, some of the timber a-head, going down head foremost, strikes either against the side, or some sunken rock in the middle of the stream, in which case the tree suddenly halts, and, veering round, impedes the rest of the timber, until the congregated mass, forcing its way, thus clears the passage, perhaps just before the canoe reaches it. At other times, in traversing the stream to avoid difficulties, the pursuing timber approaches the canoe nearer than is agreeable. In some places the river suddenly narrows, and here, it is said, the waves are not only tremendous, but the whole character of the torrent seems to be changed, for the water apparently ceases altogether to descend the channel, doing nothing but as it were boiling and bubbling up from the bottom. In approaching this caldron, the case seems hopeless, and often continues so until the canoe is close upon it, when the Indian's eagle eye searches out some little aqueous furrow, through which his nutshell vessel can pass, and though his countenance is as tranquil as ever, yet the muscular exertion he makes to attain this passage will not, it is said, easily be forgotten by any passenger whose fortune it has ever been to observe it. As soon as the declivity of the rapids has ended, the water instantly becomes tranquil, the Indians sit down in the canoe, and, on reaching the shore, one of them carries it on his shoulders during the remainder of the day.—*Quarterly Review*

Man was formed with an understanding, for the attainment of knowledge; and happy is he who is employed in the pursuit of it. Ignorance is in its nature unprofitable; but every kind of knowledge may be turned to use. Diligence is generally rewarded with the discovery of that which it seeks after; sometimes of that which is more valuable.

Human learning, with the blessing of God upon it, introduces us to divine wisdom; and while we study the works of nature, the God of nature will manifest himself to us; since, to a well-tutored mind, "The heavens," without a miracle, "declare his glory, and the firmament sheweth his handy-work."—Bishop Horne.

It is well said that nothing is lost. The drop of water which is spilt, the fragment of paper which is burnt, the plant that rots on the ground, all that perishes and is forgotten, equally seeks the atmosphere, and all is there preserved, and thence daily returned for use.—Macculloch.

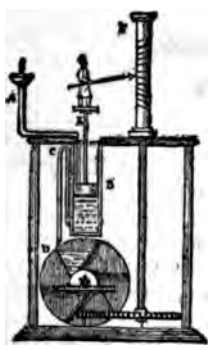
ON THE EARLY MODES OF MEASURING TIME.

No. IV. THE CLEPSYDRA, OR WATER-CLOCK.

As the sun-dial can be of no use when the sun is clouded, and during the time between sunset and sunrise, whether that period be more or less than twelve hours, we find that, from a very early period, the lapse of equal intervals of time was noted by the dropping of water from one vessel into another, the rapidity of the flow being adjusted to the size of the vessels.

The general title of *Clepsydra* was given to these instruments; that being the name originally given to the first instrument of the kind used at Athens. It is derived from κλεπτω, (I steal), and ὑδωρ (water),—evidently alluding to the *stealthy* way in which the water flowed from them. Clepsydras were in general so arranged that a given quantity of water flowed out in exactly half a day, or in exactly a whole day, as might be deemed most desirable; and the aperture, by which the water escaped, was so adjusted that an equal quantity should flow out every hour. This being the groundwork of the arrangement, the form and minor details of the instrument were various. Thus Ctesibius, an Egyptian, who flourished in the second century before the Christian era, is said to have constructed a little model of the human figure, of which the head had a dejected and drooping appearance. This is not shown in the figure. Tears dropped from his eyes into a vessel containing water at A, whence it flowed through a pipe into the cistern B, upon the surface of which another little figure floated, placed on the top of the rod E, who had a wand in his hand, which pointed to the day and hour on a pillar near him.

Now the cistern B, having been emptied at the close of one day, was filled from A, in another day of twenty-four hours; and when the water which rose in the leg of the siphon-tube connected with the cistern, flowed over the part C, the cistern was again emptied by this siphon into one division of the water-wheel at D, which was caused to turn a certain space downwards, by the weight of the water thus thrown out. This wheel has a pinion, which sets a toothed wheel in motion, which, by its axis, moves another wheel below. The consequence of this arrangement is, that the column F turns round once in a year, or $\frac{1}{365}$th of a circle in one day. The column has straight lines, lengthwise, according to the days of the year, and curved lines, round it, answering to the hours of the day; these latter vary in their distances according to the lengths of the hours, which with many of the ancients were longer in Summer than in Winter. The day, therefore, was just ending, when the float was up even with C, and began as soon as B became empty.



Descriptions have been handed down to us of clepsydras in which the flowing of water combined with the mechanical action of wheel-work, enabled the observers to note, not only the division of a day into hours, but also the age of the moon, and the position of the sun in the ecliptic. Vitruvius, the celebrated writer on architecture, gives descriptions of clepsydras, which not only afforded astronomical information, but blew trumpets, projected stones, and performed other wonderful offices.

The invention of clepsydras appears due either to the Babylonians, or to the Egyptians,—most probably to the latter. In support of which supposition reference has been made by some writers to the ancient Nilometers, or Canobs, as having possibly suggested the idea. The nilometer was a tank, or cistern, containing water; and an officer was deputed to observe the quantity of water in the tank, so that it should serve as an index to the state of the Nile. The fertility of that remarkable country was and is dependant greatly on the overflowing of the Nile; and persons, by inspecting the nilometer, were enabled to judge of the rapidity of the rise or fall, by the aid of a graduated scale placed inside the tank. Such an indication of seasons by the flowing of water might have suggested the idea of measuring the hours of the day by similar means.

But, be that as it may, the water-clocks found their way into Greece, and about two centuries before the Christian era, Scipio Nasica, the cousin of Scipio Africanus, brought one to Rome. Clepsydras were, from their construction, rather costly, one being considered sufficient for each town. It was situated in an open place, and the nobles and wealthy families used to employ servants (generally boys or girls) to acquaint them with the time, as indicated by the public clepsydra, which was always attended or guarded by a slave. The humbler classes had also the means of knowing the time at stated periods, when the city guard was changed. The attendant of the clepsydra blew a horn at regular intervals, as a signal for the changing of the guard, and the sound of the horn could be heard to a considerable distance. Cicero relates that, in the Roman courts of justice and in the senate, clepsydras were kept, to confine the speeches of the advocates and senators within due limits: hence, a forward, noisy speaker,—a brawler or wrangler,—was said "to bark at the clepsydra," a term applied to those who talked with great volubility and pertinacity during the time allotted to them for their speeches. This allotted time was regarded with jealous eagerness by the speakers, and, in order that no fraud or deceit might be practised, an officer was appointed to distribute the water equally to both parties. The speakers were so careful not to lose or mis-spend their time-measuring water, that, if at all interrupted, they would stop the flowing of it during the continuance of the interruption. If, however, any person had ended his speech before the time allowed him had expired, he was permitted to give the water that remained in the clepsydra to another speaker, who by that means was enabled to lengthen his own speech. These instruments were afterwards kept as articles of necessity in the houses of the great.

Cæsar, when he conquered Britain in the year 54 B.C., is said to have seen a clepsydra there, and by its indications, to have observed that the length of the day (as distinguished from night) was, in the Summer months, greater in Britain than at Rome. This fact, respecting the length of the day, is owing to the greater northern latitude of Britain; but how such an instrument came into the hands of the Britons, whether it was the result of their own invention, or borrowed from their southern neighbours, we have not now the means of determining

It is at all times difficult to trace the extension of the use of a process or an instrument from one nation to another. The comparatively recent invention of printing leaves the history of many ingenious inventions in the uncertain and perishable form of manuscript, or still less certain, that of oral tradition. For instance, it was not until within a few years, that a translation of a Hindoo book has brought to our

knowledge the fact that clepsydras were known in India 700 years B.C. The Hindoos, however, were, of old, skilled in mathematics and astronomy.

The invention of clocks and watches brought both the sun-dial and the clepsydra very much into disuse. Tycho Brahé, the celebrated astronomer in the sixteenth century, measured the motions of the stars by means of a clepsydra; but since his time it has been very little else than a philosophical toy, and is now only regarded as a relic of former days. They were much in use in the dark ages, and were found made of tin in France and Italy in the seventeenth century.

Another mode in which clepsydras have been constructed, is that of a cylindrical column of water, of a definite height, with a small hole in the bottom of the vessel, for the water to escape. Suppose, in the annexed figure, such a column to be one hundred inches in height, and that the water was found to occupy exactly ten minutes in flowing out: one side of the vessel must be divided by marks or lines into ten parts; so that when the water had sunk, say from 10 to 9, we should know that one tenth of the time had elapsed since the water began to flow. Before the laws which regulate fluid bodies were well understood, there was great inaccuracy in the construction of this form of clepsydra; but Ctesibius applied himself to the removal of such errors, and found that, in conformity with those laws, the marks or divisions for the hour-lines of a clepsydra must not be equidistant, but must decrease in distance in a certain ratio from above, downwards. When the vessel is full, the water flows out more rapidly from the hole in the bottom, than when it is but half full; and in the latter case more rapidly than when only one quarter full, and so on. This being the case, it is found that the divisions must be regulated thus: suppose the vessel, as before, to be one hundred inches in height, and of equal diameter throughout; then the different portions of water between 10 and 9, 9 and 8, &c., flow out in equal times, one minute for each portion. If we now look to *quantity*, we find that there flows out in the first minute the difference between 100 and 81, equal to 19 inches in height of water; in the second minute 17 inches and so on. The higher the column, the more quickly the water flows out, in consequence of the pressure from above; so that a greater quantity flows out in a given time, at the early part of this clepsydra's action than at the close. By inspecting the figure we observe that the quantity which flows out in a given time is *as the square of the time.*

There have been two modes suggested, by which the divisions may be equidistant. One is by having the vessel not cylindrical, but parabolical; that is, something like a bee-hive turned upside down, with a small hole in the middle: in this case the greater diameter of the open end would counterbalance the greater velocity of the flow when the vessel was full. The other suggestion is to let water flow from one vessel to another, through a siphon tube of very small bore. One of the properties of the siphon is that liquids flow through it with a constant degree of rapidity, and this has caused it to be employed as a water-clock. A clepsydra, on this principle, was deposited in the National Repository a few years ago by Mr. Partington.

The ancients sometimes employed as clepsydras hollow globes, and at other times open cups, the globe and the cup each having a small hole in the bottom. The instrument was made to float upon water, which, gradually entering at the little hole, filled the space within, and after the lapse of a certain time, the globe or cup would sink.

There were anciently clepsydras, in which the liquid employed was mercury or quicksilver: it is indeed obvious that any liquid may be made available for this purpose, by regulating the size of the orifice accordingly.

THE PRISONER OF THE LORD.

A SABBATH HYMN FOR A SICK CHAMBER.

THOUSANDS, O Lord of hosts! this day
Around thine altar meet;
And tens of thousands throng to pay
Their homage at thy feet.

They see thy power and glory there,
As I have seen them too;
They read, they hear, they join in prayer,
As I was went to do.

They sing thy deeds, as I have sung,
In sweet and solemn lays.
Were I among them, my glad tongue
Might learn new themes of praise.

For thou art in the midst, to teach,
When on thy name they call;
And thou hast blessings, Lord, for each,
Hast blessings, Lord, for all.

I, of such fellowship bereft,
In spirit turn to thee.
Oh! hast thou not a blessing left?
A blessing, Lord, for me?

The dew lies thick on all the ground,
Shall my poor fleece be dry?
The manna rains from heaven around,
Shall I of hunger die?

Behold thy prisoner; loose my bonds,'
If 'tis thy gracious will.
If not, contented in thine hands,
Behold thy prisoner still!

I may not to thy courts repair,
Yet here thou surely art:
Lord, consecrate a house of prayer
In my surrendered heart.

To faith, reveal the things unseen;
To hope, the joys untold;
Let love, without a veil between,
Thy glory now behold.

Oh! make thy face on me to shine,
That doubt and fear may cease;
Lift up thy countenance benign
On me, and give me peace.

JAMES MONTGOMERY.

FASTIDIOUSNESS, the discernment of defects, and the propensity to seek them, in natural beauty, are not the proofs of taste, but the evidences of its absence: it is at least an insensibility to beauty; it is worse than that, since it is a depravity, when pleasure is found in the discovery of such defects, real or imaginary. And he who affects this, because he considers it an evidence of his taste, is, at least, pitiably ignorant; while not seldom punished by the conversion of that affectation into a reality. And it is the same in criticism, as applied to works of literature. It is not the eye for faults, but beauties, that constitutes the real critic, in this, as in all else: he who is most discerning in the beauties of poetry, is the man of taste, the true judge, the only critic. The critic, as he is currently termed, who is discerning in nothing but faults, may care little to be told, that this is the mark of unamiable dispositions or of bad passions; but he might not feel equally easy, were he convinced that he thus gives the most absolute proofs of ignorance and want of taste.—MACCULLOCH.

THE BAMBOO.

THE tree-like size of these plants associates them in some measure with palms. They are applied, in China, India, and Japan, to a great number of useful purposes: sections of the small ones are made into cups, and of the larger ones into tubs and boxes. Water-pipes are often made of them, and they are used in the construction of fences, building houses and boats, and making various articles of furniture. The tender tops of the young shoots form a favourite West India pickle.

Perhaps the best idea, though still a faint one, of the beauty and magnificence of these arborescent grasses, may be given to the untravelled naturalist, by quoting Capt. Basil Hall's account of the impression a first view produced on him. He says, Early in the morning of a beautiful day in the latter end of September, I set out from the bare table-land of Mysore, and proceeded towards the hilly and thickly-wooded regions overhanging the Malabar country. When I awoke in my palankeen, I knew not very distinctly where I had got to, for I had been dreaming all night about the monstrous statue at Shrivaabalagol. I sat up, drew the door gently back, and, looking out, found myself in the midst of one of the most curious and magnificent scenes which my eyes had ever beheld. It appeared as if I were travelling among the clustered columns of some enormous and enchanted Gothic cathedral, compared to which the minster at York, or the cathedral at Winchester, would have seemed mere baby-houses; the ground extended on all sides as smooth and flat, and clear of under-wood, as if the whole had been paved with grave-stones.

From this level surface rose on every hand, and as far as the eye could penetrate into the forest, immense symmetrical clusters of bamboo, varying in diameter at their base from six feet to twenty or thirty; and even to twice that width, as I ascertained by actual measurement. For about eight or ten feet from the ground, each of these clusters or columns preserved a form nearly cylindrical, after which they began gradually to swell outwards, each bamboo assuming for itself a graceful curve, and rising to the height, some of sixty, some of eighty, and some even of one hundred feet in the air,—the extreme end being at times horizontal, or even drooping gently over, like the tips of the feathers in the Prince of Wales's plume.

These gorgeous clusters stood at the distance of fifteen or twenty yards from one another, and, being totally free from the interruption of brushwood, could be distinguished at a great distance—more than a mile certainly, in every direction, forming, under the influence of an active imagination, naves and transepts, aisles and choirs, such as none but a Gothic architect ever dared to conceive. Overhead the interlacing curves of the bamboos constituted as complete a groined roof as that of Winchester or Westminster, on a scale of grandeur far beyond the bold conception even of those wonderful artists who devised that glorious school of architecture, which, in the opinion of many people, has raised the dark centuries immediately subsequent to the era of the crusades, almost to the level of the days of Pericles.

On counting the separate bamboos in some of the smallest, and also in some of the largest clusters, I found the numbers to vary from twenty to thirty, to upwards of two hundred; and the height generally from sixty to a hundred feet from the ground, to the point of intersection of the curves overhead. Most of the bamboos were somewhat thicker than a man's thigh at the ground, where, as I have before said, they are clustered so close as to be almost in contact. They then taper off very gradually to the extreme end, where the point is not thicker than a quill.

There occurs a joint at about every foot and a half, distinguished not only by a slight flat ring or fillet, but by a set of small branches, eight or ten feet long, striking out at right angles to the main bamboo. These minor shoots are again divided into joints, from which other series of shoots, still more minute, are thrown out; and so on for many successions, the last always terminating in a sharp-pointed narrow leaf, two or three inches long, and half an inch wide in the middle, not unlike a large tea-leaf when spread out. As each bamboo, of the hundred or more forming the cluster, sends out shoots from every joint, and as all the joints of these subordinate plants do the same, a compact mass is formed by these innumerable little branches, which cross one another at every possible angle. If a person were to fill a hat full of pins and needles, and shake it about for some minutes, it might give a notion of the inextricable confusion which is presented to the eye on looking into one of these clustered columns of bamboos. It is only at the top, where the bend takes place, that the foliage has full room to play, or where the tapering arms of this magnificent plant form, by their meetings and crossings, a complete system of pointed arches.

What surprised me very much, and greatly puzzled me at first, was, to observe, that notwithstanding the multitude of lateral shoots from each of the main bamboos, and from all the subordinate branches, not a single trace of displacement, or the slightest obstruction to the growth of any branch, could be detected. Every person must have heard of the astonishing rapidity of the growth of the bamboo; it is said indeed that in one season it starts up to its whole length. I do not know if this be true, but am quite certain that if one of the main bamboos were to spring from the ground in the centre, or even near the sides, of the cluster, and that from its joints there were at the same time to sprout out the lateral branches I have described, it would be impossible for the main stem to force its way through the obstructions presented by the network, formed by the little branches growing from the joints of the other bamboos in the cluster.

After examining a considerable number of the clusters, however, we can, I think, perceive how nature manages this difficult affair. When the bamboo first springs out of the ground, it is about as thick as a man's wrist; but it is armed with a very sharp point, not unlike that of a wooden instrument called a fid, which sailors make use of in splicing ropes; as this point is extremely hard, and the bamboo always highly polished, it readily makes its way through the very thickest masses of the little branches, as one might thrust a sword through a quickset hedge. Thus the bamboo, whose growth is prodigiously rapid, starts upwards; and by reason of its smooth sharp end, and perfectly smooth sides, easily makes its way to its extreme length and thickness; without, as I conceive, sending out a single lateral shoot from any of its joints, till the utmost extent has been gained. The subordinate branches from the joints then, but not till then, begin to start out horizontally, all these being, after the manner of the principal stem, exempted from lateral shoots at their joints till their utmost length has been reached. In consequence of this beautiful arrangement, none of these successive branches, however numerous or delicate, find any difficulty in piercing the confusion.

I saw bamboos in every different stage of this process, and in particular I noticed several of the main stems rising to the height of seventy feet and upwards, of a clear yellow colour, and evidently of recent growth, but without a single lateral branch growing from their joints from top to bottom; and this led me to infer that their extreme height had not yet been reached, or was but just attained.

CONTRIVANCES OF ANTS.

A GENTLEMAN in the Island of St. Croix, instituted several experiments with reference to ascertaining the truth of what he had been often told, of the ingenuity, and apparent reasonings, of the ant of that beautiful island. Having slain a centipede, which had been sent him by a friend, he laid it on the window-stool within his apartment, where, though not a single individual of that mischievous race of vermin had been seen, to his great gratification, in the course of a few hours, one solitary ant suddenly made its appearance through a crevice in the casing, attracted, probably, by the odour of the dead body. Shortly after, having surveyed the premises, it disappeared, but speedily returned, with a host of companions, to whom the discovery of a prize had unquestionably been communicated; a more careful survey of the magnitude of the object was evidently instituted. The whole company then disappeared simultaneously through the crack; but an army was put in requisition, for the third appearance was a multitude.

Having mounted the carcass, examined minutely its exact position, and satisfied themselves that it was actually bereft of life, and that no danger would be incurred from their premeditated operations, a new and unlooked-for series of labours were commenced, bearing such a striking analogy to human reason, as manifested in what is commonly called contrivance, that if there is no intelligence in it,—why, the metaphysicians have in reservation an unexplored field of observation. Not being able to move the mass entire, they divided themselves into platoons, and cut the body into portions of about half an inch in length, which was effectually and skilfully done, between a late hour in the afternoon and the following night, and each piece transported to their citadel, through some contiguous aperture, of sufficient diameter to allow the loads to pass. When the observer arose at daylight, every part had been carried away but the head, which was really moving off towards the hole, surrounded by an immense concourse of admiring spectators, probably on the *qui vive*, happy in the delightful anticipation of future feasts and revellings. On further scrutiny, he found that the decapitated head was mounted on the backs of about a dozen bearers, who, like a Roman phalanx with a testudo upon their shoulders, were marching off in an orderly manner, towards the same orifice through which all the rest had disappeared.—?

I CONFESS myself to be one of those who believe, that it is not always in the capital, or among the busy haunts of a large town, that a traveller has the best opportunities of making himself acquainted with the character, and habits, and dispositions of a strange people. To the capital you doubtless turn, if your object be to examine into the machinery of the general government, or to hold converse with the great and distinguished members of the community, whether they deserve to be so accounted because of any merit attaching to themselves, or owe their greatness to circumstances not of their own creating. But of the people, properly so called, a foreigner can see in the capital very little. He may join them in their public amusements; he may observe their modes of buying and selling; he may listen to their conversation in the streets, or at a table d'hôte, and form a correct enough judgment of their skill as artisans; but of their character properly so called, that is to say, of the temper of their minds, and of the causes which produce it, he can know nothing. The state of society in one large town resembles, in all essential points, so closely the state of society in another, that the traveller becomes bewildered, and is not unapt to treat as peculiarities in one place, habits which, in point of fact, extend far beyond it.—GLEIG'S *Travels in Germany*, &c.

ON WRITING MATERIALS.

No. X.

IN the former articles of this course, we have considered, at some length, the most important and interesting writing materials. Those which remain to be described are slates and slate-pencils, writing tablets, pen-knives, and pounce.

Writing Slates. These useful articles are made of the same material as the slates for the roofs of buildings, but prepared and smoothed with more care.

The principal sources of slate in England are Cornwall and Devon; various parts of North Wales, and of Anglesea; near Ingleton, and in Swaledale, on the North West of Yorkshire; in Cumberland and Westmoreland. It also occurs in a low range of mountains at Chamwood Forest, in Leicestershire, nearly in the centre of England.

France possesses very valuable slate quarries, in which fossil organic remains are found embedded, in great abundance, in the slate. Vestiges of shrimps have been found so numerous, that forty of them have been found in a square foot of slate. In Italy, slate has been found at Lavagna, near Genoa. In Switzerland, it occurs in the Canton of Glaris. Some is also found in Saxony; a great quantity in North America, and in other parts of the world.

Slate is in most cases worked in open quarries, by digging away the upper strata of the ground until the slate is met with. There are only two instances in England in which slate is worked in a mine, by digging a shaft, nd then excavating galleries, in the manner of coal-mines.

One of the mines of slate in France, is near Charleville, and the following is a description of it. The mouth of the mine is near the summit of a hill. The stratum of slate is about sixty feet in thickness, and inclines downward at an angle of 40°. It has been excavated, by a principal gallery, to the depth of 400 feet; and many lateral galleries have been driven, which extend about 200 feet on the side of the main gallery. Twenty-six ladders are placed against the main gallery, for the passage of the workmen and the carriage of the slate. The slate is cut into blocks of about 200lbs. weight, which they call *fair*. Every workman, in his turn, carries them on his back to the very mouth of the pit, mounting the twenty-six ladders, or a part of them, according to the depth of the bed where he is working. When brought into the open air, these blocks are first split into thick tables, which are called *repartons*. The workman holds the block between his legs, puts the chisel against the side, and divides the block with a blow of his mallet. The *repartons* are divided in a similar manner into roofing slates and writing slates. These operations are performed soon after the block is drawn from the quarry; for if the stone has time to dry, it would no longer be possible to split it.

Perhaps the most remarkable reservoir of slate in Europe is at Hourston Crag, a lofty mountain near Buttermere Lake, in Cumberland: the mountain is nearly perpendicular, and rises to a height of 2000 feet above the level of the sea. On account of the difficulty of access, the workmen take their provisions for a whole week, and sleep in temporary huts, on the summit of the mountain. During the winter they are generally involved in clouds, and not unfrequently blocked up by snow. The slate is conveyed down a zigzag path on sledges, one man attending to prevent the acceleration of the descent. When the slate is emptied at the bottom of the hill, the man carries the sledge on his shoulders up to the top.

There is a considerable degree of strength in most kinds of slate, which makes it valuable for a variety

of purposes in building. The kind used for writing slates is of a smooth texture. It is reduced to a state of considerable thinness by cleavage, and by grinding, and thus presents the smooth surface which is familiar to us. Slates are generally fixed into slight wooden frames, both to save them from fracture by a fall, and to preserve the writing which may be on them. The making of these frames requires no particular comment.

Slate Pencils. These useful articles are made of a softer kind of slate than the material on which they are employed. This kind of slate frequently accompanies alum-slate, and contains a considerable portion of carbon. Some varieties have a slight degree of lustre, of which others present none. The fracture, when in small fragments, is not nearly so laminated, or scaly, as that of common slate. There are several different kinds of this slate, differing in some respects from one another, but all agreeing in the circumstance of being softer than the slates used as writing tablets. There is the common slate-pencil, which leaves a white mark on slate, of which the cylindrical pieces of *Dutch* pencil are the hardest: there is the grayish-black kind, principally used by masons, carpenters, &c., to mark with, as it leaves a black line when rubbed on paper or wood:—lastly, there is a very fine and pure kind used by artists, for designs, which is called in France, "Pierre d'Italie." And in England, "French chalk." This often undergoes preparation before it passes into the hands of the artist.

Ivory Writing Tablets. Among the materials which have been used instead of paper, as a substance on which to write, *ivory* may be shortly alluded to. Small memorandum or note books, in order to possess the required utility, should afford the means of erasing any writing which may be upon their surfaces, in order to make room for other memorandums. Several different materials have been employed for this purpose, one of which is ivory.

Ivory is the name given to the tusks of the elephant, and of the walrus, or sea-horse. These tusks are hollow at their insertion into the jaw, and for a considerable space from it. The colour of the exterior varies according to circumstances, but the interior is of a cream-white colour. The best elephants' tusks are brought from Africa, being better than those obtained from Asia, as being of a closer texture, and less likely to become yellow. But the hardest and whitest of all ivory, is that obtained from the tusks of the sea-horse. These tusks are short and very much curved; the thick end is hollow, as in the tusk of the elephant.

The manufacture of these tusks into articles of various kinds, is carried on in various places. In England, at Dieppe, in France, and in China and India, where the skill of the artists exceeds that of Europeans in the same branch of art. The preparation of ivory, for writing tablets, may be assimilated to that of the small tablets for miniature portraits, in water colours. The ivory is split into thin laminæ, or leaves, which are afterwards smoothed and polished, and in this form it furnishes a beautiful surface for either the pen or the pencil.

We may include under this same head various other contrivances as furnishing materials on which to write. There are "Asses' skin" memorandum books, "flexible tablets," "prepared tablets," &c. &c., which are familiar to all who visit stationers' shops. Instead of dwelling on the modes of manufacturing these several kinds of tables, we will briefly show the principle on which they act, for, however they may differ in other respects, they all act upon one principle. This principle is *non-absorption*. When we write on paper, why cannot we rub it out, either by dry friction or with the wet finger? Simply because the fibres of the paper have absorbed some of the ink into their very substance, from which it cannot again be extracted, except by scraping away the fibres themselves with a knife, or by the application of some strong agent which will act chemically on the ink.

But if we can shield the fibres from the action of the ink, we prevent the absorption, and ink marks can be again eradicated. Varnish of almost every kind presents us with a surface through which black-lead pencil marks, and ink marks, will not penetrate; so that almost every material which will receive a coating of varnish, may be made into a writing tablet. Sometimes the material employed is of a flexible nature, so as to yield in the convenient form of a book; while in other cases the material is stiff and unyielding. We can write on a French-polished mahogany table with a pen, and a moistened cloth will remove the ink; although, if we were to apply ink to the plain surface of the mahogany, before it received its coating of polish, the ink would be absorbed by the fibres, and a stain would be perceived. We could, in like manner, write on the surface of an oil-painted door, or wall, and afterwards eradicate the marks. In both of these last-mentioned instances, a thin fibre protects the fibres of the wood from the ink, which they would otherwise absorb; and thus the power of eradicating the marks which might be left, is afforded to us.

But generally speaking, writing tablets are not subjected to the severe test of receiving, and then parting with, the marks of ink flowing from a pen: a black-lead pencil being generally the marking material. This latter not being a fluid, its tendency to spread and to adhere is much smaller than that of ink, and it is therefore much more readily removed by a moistened finger.

It will therefore easily be understood how asses' skin, or any other flexible membrane covered with a species of varnish, will, in the first place, receive an impression from a black-lead pencil, and afterwards readily part with it by a little friction. It follows pretty clearly from these remarks, that the aptness of any particular substance for serving as a writing tablet, depends not so much on the material of which it consists, as on the texture of the surface, whether natural or artificial, which it presents. These general remarks will give a more correct notion of the nature of writing tablets than a particular description of all the novelties which from time to time spring up in this form. They all agree in principle, and differ only in minor details.

Genius, strictly speaking, is only entitled to respect when it promotes the peace, and improves the happiness and comfort of mankind. What should we think of the Gardener who planted his flower-bed with henbane and deadly nightshade? What should we think of the General, who being intrusted with an army, and a plentiful supply of military stores, applied these powers to degrading and enslaving his own country? He would be visited with scorn, and punished as a traitor. And why should the man who directs the artillery of his genius, delegated to him for high and holy purposes, to shaking those foundations on which the happiness of his species rests, and who applies the divine spark within him to the kindling of low and debasing passions, be allowed to hear his plaudits swelled in proportion as his powers of doing mischief become apparent. Talent is always accompanied with the responsibility of using it rightly; and the neglect or pity of the virtuous is the penalty which the child of genius pays, or ought to pay, for its abuse.

However splendid talents may compel our admiration, they have no right to claim the general esteem of mankind when their possessor exercises them without regard of what is due to the well-being of society and himself.—*Essex Lit. Gaz.*

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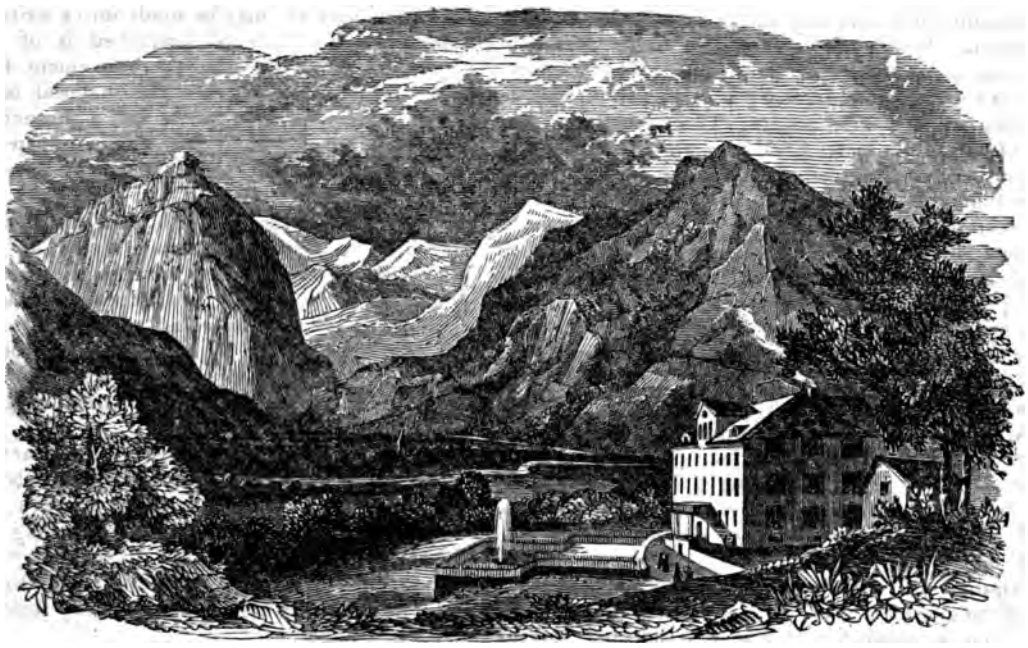
ON THE GENERAL LOCALITIES, NATURE, AND USES, OF MINERAL WATERS. II.



THE BATH-HOUSE OF STACHELBAD, CANTON OF GLARUS, SWITZERLAND.

In the preceding details we have not noticed the difference of temperature in different springs, but have spoken of them with reference to their chemical ingredients; we must, however, shortly allude to those springs, in which an elevated temperature is the most distinguishing feature.

At Wiesbaden, the capital of Nassau, is a most remarkable spring, or rather assemblage of springs, the temperature of which is 140° at all seasons of the year, and which retain their heat longer than any other water of the same temperature. Dr. Granville and Sir F. Head both compare the fuming waters of Wiesbaden to "very hot chicken broth;" and the latter jocosely adds, "I do certainly wonder why the common people should be at the inconvenience of making bad soup, when they can get much better from nature's great stock-pot, *i. e.*, the koch-brunnen (boiling spring) of Wiesbaden." These "brothy" waters are used both as drink and as a bath. In the latter form they are described as presenting to the bather a surface of dirty-white thick froth, which is by no means inviting, but they have an invigorating effect on the frame. These waters are found to be detrimental in cases of inflammation or fever, but of advantage in a great many disorders of the system.

A milk-warm spring rises at Schlangenbad, in Nassau, which is described by Sir F. Head, as producing a delightful sensation on the skin, when used as a bath. The discovery of this spring, is said by the same amusing writer to have originated thus:—

Once upon a time, there was a heifer, with which everything in nature seemed to disagree. The more she ate, the thinner she grew; the more her mother licked her hide, the rougher, and the more staring was her coat. Not a fly in the forest would bite her: never was she seen to chew the cud; but, hide-bound and melancholy, her hips seemed actually to be protruding through her skin. What was the matter with her? no one knew; what could cure her? no one could divine: in short, deserted by her master and her species, she was, as the faculty would term it, 'given over.' In a few weeks, however, she suddenly reappeared among the herd, with ribs covered with flesh, eyes like a deer, skin sleek as a mole's, breath sweetly smelling of milk, saliva hanging in ringlets from her jaw.

The reader will guess the sequel: the animal had found the milk-warm spring, the waters of which had strengthened her. A young lady of the neighbourhood, being in a declining condition, was induced to drink the waters of this spring, which restored her. The celebrity of the spring then followed, as a matter of course. The water is sent in bottles to different parts of Europe; where it is used as a cosmetic. It has also the reputation of tranquillizing the nerves, and soothing inflammation. The salts contained in it are muriates and carbonates of lime, soda, and magnesia, with a slight excess of carbonic acid, which holds the carbonates in solution.

4. *Saline Waters*,—are nearly all those which do not belong to the preceding division; they generally contain some of the following salts, sulphates of lime, magnesia, and soda, and carbonates and muriates of the same bases. Saline springs exist at Epsom, Cheltenham, Dunblane, Seidlitz, &c. Cheltenham water contains in a wine pint

Sulphate of soda, ...	15 grains.
„ magnesia, ...	11
„ lime, ...	4·5
Muriate of soda, ...	50
	80·5

The general medicinal character of saline water is that of being purgative when taken into the system.

Cheltenham, Leamington, and Scarborough waters are all of an aperient nature, as are likewise those of Seidlitz in Germany. Many of these saline springs have an elevated temperature, and are frequently designated *hot* springs. The Matlock water has a temperature of about 66°, and is valuable as a bath for persons of delicate constitution. The Bristol hot well has a temperature of 74°, and gushes forth at the rate of forty gallons per minute. The medicinal effect of the Matlock and Bristol waters is due more to their temperature than to their saline contents. The same may be said of the Buxton waters, which emerge from the ground, at a temperature of 82°. The Bath waters are considered to be beneficial both on account of their elevated temperature and of their saline ingredients. At Carlsbad (Charles's bath) in Bohemia, 192 million cubic feet of water, at a temperature of 64°, spring from the ground in one day.

Among mineral waters we may probably include sea-water. The proportion of saline matter existing in sea-water is subject to continual variation. In the Atlantic Ocean, within the tropics, the water contains one twenty-fourth of its weight of saline matters. From the great heat of those latitudes, evaporation from the surface must be extensive, while at the same time the influence of rivers in counteracting the saltness, by the addition of fresh water is scarcely appreciable. In colder climates, where evaporation is less, there is less salt in the water. We subjoin two analyses of sea-water by Dr. Marcet and Dr. Murray. The former physician found that in 500 grains of water from the Atlantic ocean there were:—

Pure water,	478·42 grains.
Common salt,	13·3
Sulphate of soda,	2·33
Muriate of lime,	0·995
„ magnesia,	4·955
	500·

Dr. Murray found a pint of sea-water to contain:—

Muriate of soda,	159·3 grains.
„ magnesia,	95·5
„ lime,	5·7
Sulphate of soda,	25·6
	286·1

Iodine and bromine have sometimes been detected in sea-water. Its specific gravity is generally 1·0277. The water of the Dead Sea contains as much as one-fourth of its weight of saline matters, and is of such a specific gravity (1·211) that a man may lie easily on its surface without sinking.

Dr. Russell says that sea-water is beneficial in obstructions of the glandular apparatus, in glandular swellings, in recent tumours of the joints, in diseases of the skin, and in obstructions of the liver and kidneys. The frequent recommendation of sea-bathing indeed sufficiently indicates the value in which it is held.

We may here state that many attempts have been made to convert sea-water into a state fit for drinking, by removing the salt, &c. Dr. Irving received 5000*l.* for a contrivance having this object in view. The water was put into a boiler, in the cover of which a pipe was fixed. A fire was applied to the boiler, and the outside of the tube was kept constantly wetted; by which the steam that passed through it was condensed into water. The salts contained in the water did not vaporize with it, and were therefore left behind. It was stated that the common fire and boiler of the ship might be used; and moreover that the steam arising from boiled provisions might be collected and condensed in the same manner. This proposal was first put into practical application by Captain Phipps (afterwards Lord Mulgrave) in his voyage to the North Pole in 1770. Sixty gallons of fresh water were procured from the boiler of the vessel during the cooking of the ship's provisions.

After a few remarks on the chemical effects of some springs, we shall briefly consider the results which sometimes follow from keeping water in metallic vessels.

Some springs contain a considerable quantity of siliceous earth in solution, but these are not common. The most noted are the boiling springs of the Geyser and Rykum in Iceland, and some hot springs in India. They contain soda, and this assists in rendering the siliceous earth soluble.

Petrifying springs are those where the water penetrates the pores of vegetable and animal substances placed in them, dissolves out and removes the particles of which they are composed, and substitutes earthy or stony particles, which are arranged in the same way as those of the former substances, and preserve their general form. There are many waters of this kind.

The rivers Danube and Pregal, in the course of ages convert in this manner into petrifactions stakes of wood placed in them. There are also incrusting springs, which deposit the earthy particles they contain in the form of a crust around any substances placed in them. Those earthy particles are carbonate of lime, held in solution by carbonic acid, which leaves the water when it becomes exposed to the air, and then the carbonate of lime is precipitated.

Our readers may perhaps call to mind many instances of poisoning by means of lead, recorded in the newspapers. The action of this metal upon the human frame is highly injurious, and since water is conveyed in leaden pipes, and stored occasionally in leaden reservoirs or cisterns, it is important to inquire whether water exerts any action upon lead so as to dissolve it, and in this way to get it introduced into our food.

This inquiry we may answer with a decided negative. Pure water exerts no action upon metallic lead; but there are certain gases which water nearly always holds in solution, which do attack lead, and the result of such action is a compound which is soluble in water. So that although water does not, in a direct manner dissolve lead, yet it does so indirectly, because all water employed for domestic use (except distilled water confined in close vessels), contains the gases to which we have alluded; viz., oxygen and carbonic acid. The oxygen to which we here allude, is not that which forms one of the constituents of water, but it is that which enters into the composition of atmospheric air, which water dissolves and holds in solution. That these gases are not chemically combined with the water, may be proved by placing a glass vessel of water under the receiver of an air-pump; on removing the pressure, the dissolved gases will be set free, and, forming myriads of bubbles, give a curious appearance to the water.

The Chemist, when he wishes to know whether a liquid possesses any *acid* properties, is not satisfied with the fact that it tastes *sour*. It is not necessary that he should appeal to his sense of taste (and in many cases it would be highly dangerous were he to do so); and moreover, the senses are at best but fallacious guides, since a slight, though decidedly acid taste to one person, may be quite inappreciable to another. The chemist has a test by which he is enabled to distinguish acids with precision, in consequence of a property possessed by all acids, (except a very few of rare occurrence,) of converting vegetable *blue* colours into *red*. A slip of paper is commonly adopted, stained by a vegetable substance called

litmus. When this paper is dipped into a solution containing free acid, (that is, acid not in chemical combination with another body,) the blue litmus paper is changed into red. Another property of acids is that of combining with alkalies, and in some cases forming neutral salts, or salts in which the acid and alkaline constituents are so nicely balanced, as to neutralize each other. But there is another property of acids which will bring us back to our subject. Acids dissolve the oxides of metals, but never the metals themselves. Thus:—green, white, and blue vitriol, are chemically called sulphates of iron, zinc, and copper; but in strictness, they are sulphates of the oxides of these metals: that is, iron united to oxygen, forms oxide of iron, and this is soluble in sulphuric acid, whereas pure iron is not.

Now in order to get a compound of lead which shall be soluble in water, the metal must first be oxidized; and atmospheric air (of which oxygen is a constituent part) is present in river and spring waters. This gas combines with lead, and forms oxide of lead, and the carbonic acid also present in the water, dissolves this oxide when it is formed; and the resulting compound is carbonate of lead, or white lead.

It is fortunate, perhaps, that carbonate of lead is but sparingly soluble in water, since it is so highly pernicious to animals. Indeed, the quantity dissolved is so exceedingly small, that very delicate tests are necessary to detect it. Water may be protected from adulteration by lead by dissolving in it so small a quantity as $\frac{1}{1000}$ of its weight of sulphate of soda (glauber salt), or $\frac{1}{2000}$ of phosphate of soda, or hydriodate of potash. When either of these substances is present in water contained in leaden vessels, the lead is at first covered with a very thin film of carbonate of lead, in the same way as if no protecting substance were present in the water. But a chemical action goes on between the carbonate of lead and the protecting substance, and the result is a decomposition of the carbonate of lead, and the formation of another substance entirely insoluble in water. The latter substance occupies the place of the film of carbonate of lead, and remains firmly attached to the surface of the leaden cistern; thus preventing all further action of oxygen on the metallic lead, and consequently, the carbonic acid has no oxide of lead to dissolve. Many river and spring waters contain salts which protect the water from lead, and such waters may be safely collected in leaden cisterns.

When cisterns are constructed of iron or zinc, oxides of those metals are formed, and dissolved by carbonic acid. A case of this nature came under the notice of the writer some time since.

At an inn, a few miles from the residence of the writer, a well, some years ago, had been dug through the chalk which forms the upper stratum of the soil for many miles round. From this well, the inn had been supplied with water drawn up by hand, until a recent period, when this primitive and laborious plan was superseded, and a pump constructed, the pump-box and pipes of which were of cast iron. A few weeks after the pump had been in use, the water was found to be discoloured by boiling, red flakes and a general muddiness were very apparent, and the water presented so unpleasant an appearance and taste, as to cause general complaint. The innkeeper naturally attributed this defect to the pump, and refused to pay for it. A dispute arising, it was determined that the water should be analyzed, in order to ascertain whether the pump affected the water, or the water affected the pump. If the latter were the case, it is clear that no blame could attach to the pump-maker, since the fault was not in his instrument, but in the corrosive nature of the water. A bottle of the water was sent to the writer for analysis; who found it to contain free carbonic acid gas, atmospheric air, and carbonate and sulphate of lime. The traces of iron were very marked, and this explained the discoloration of the water. The free oxygen in the water converted the surface of the iron into an oxide, which the carbonic acid dissolved, forming carbonate of oxide of iron; and water containing it, being boiled constantly in the same kettle, the iron was precipitated in the state of oxide, still, however, retaining a portion of its acid. This collecting at the bottom and sides of the kettle, was stirred up by the agitation produced by boiling. Carbonate of iron is, however, harmless when taken into the stomach; whereas, had the pump been formed of lead, a carbonate of that metal would have been formed, which we have already said to be poisonous.

MARKS OF TIME.

An infant boy was playing among flowers;
Old Time, that unbribed register of hours,
Came hobbling on, but smoothed his wrinkled face,
To mark the artless joy and blooming grace
Of the young cherub, on whose cheek so fair
Time smiled, and pressed a rosy dimple there.

Next Boyhood followed with his shout of glee,
Elastic step, and spirit wild and free
As the young fawn, that scales the mountain height,
Or new-fledged eaglet in his sunward flight;
Time cast a glance upon the careless boy,
Who frolicked onward with a bound of joy!

Then Youth came forward, his bright glancing eye
Seemed a reflection of the cloudless sky!
The dawn of passion in its purest glow,
Crimsoned his cheek, and beamed upon his brow,
Giving expression to his blooming face,
And to his fragile form a manly grace;
His voice was harmony, his speech was truth—
Time lightly laid his hand upon the youth.

Manhood next followed, in the sunny prime
Of life's meridian bloom; all the sublime
And beautiful of nature met his view,
Brightened by Hope, whose radiant pencil drew
The rich perspective of a scene as fair
As that which smiled on Eden's sinless pair!
Love, fame, and glory, with alternate sway,
Thrilled his warm heart, and with electric ray
Illumed his eye, yet still a shade of care,
Like a light cloud that floats in summer air,
Would shed at times a transitory gloom,
But shadowed not one grace of manly bloom.
Time sighed, as on his polished brow he wrought
The first impressive line of care and thought.

Man in his proud maturity came next;
A bold review of life, from the broad text
Of Nature's ample volume! He had scanned
Her varied page, and a high course had planned;
Humbled ambition, wealth's deceitful smile,
The loss of friends, disease, and mental toil,
Had blanched his cheek, and dimmed his ardent eye,
But spared his noble spirit's energy!
God's proudest stamp of intellectual grace
Still shone unclouded on his care-worn face!
On his high brow still sate the firm resolve
Of judgment deep, whose issue might involve
A nation's fate. Yet thoughts of milder glow
Would oft, like sunbeams o'er a mound of snow,
Upon his cheek their genial influence cast,
While musing o'er the bright or shadowy past:
Time, as he marked his noblest victim, shed
The frost of years upon his honoured head.

Last came, with trembling limbs and bending form,
Like the old oak scathed by the wintry storm,
Man in the last frail stage of human life;
Reason's proud triumph, passion's wild control,
No more dispute their mastery o'er his soul!
As rest the billows on the sea-beat shore,
The war of rivalry is heard no more;
Faith's steady light illumes his eye,
For Time is pointing to Eternity!

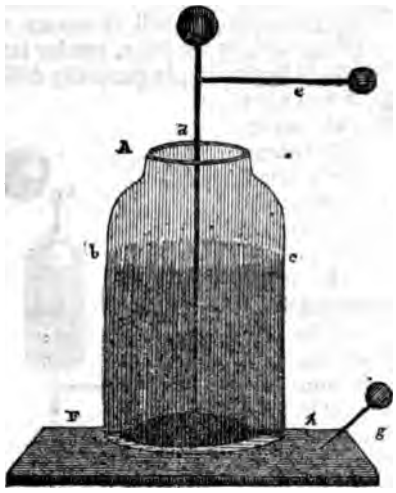
K. A. W.

ELECTRICITY.

No. IX.

THE LEYDEN JAR.

AN arrangement of the Leyden Jar, more convenient, and, as we think, more effective, than that generally adopted, is represented in the annexed figure.



A glass vessel A, of any required size, is coated both inside and outside with tin-foil, to the height *b c*. *d* is a stout brass rod (or tube), supported in the centre of the jar, by one end being secured into a piece of wood, which is hollowed out so as to fit the bottom of the jar, and to which it must be firmly secured with glue or cement. The other end of this rod terminates about six inches above the top edge of the jar, in a ball, either of brass or baked wood; the latter being most preferable. A smaller rod *e*, the length of which, as well as of a similar one *g*, must be determined by the length of the jar, is screwed into *d*, about an inch and a half below the ball. A stand F is provided, consisting of a piece of mahogany, or other hard wood about 1¼ inch thick; and to facilitate the discharge of electricity from the jar, that part of the wood on which it is placed, is coated with foil. The wire *g* is screwed into the stand F, and is brought into metallic contact with the outside coating of the jar, by means of a slip of tin-foil, pasted upon the wood at *h*. To insure perfect contact between the inside coating and the rod *d*, the piece of wood, by which the latter is supported, should also have some slips of foil pasted on it; or, if that cannot conveniently be done, the object may be effected by a piece of brass chain. The extremities *e* and *g* terminate in brass balls.

For delicate experiments, it is sometimes necessary to insulate the jar. In that case a stand with glass legs must be provided.

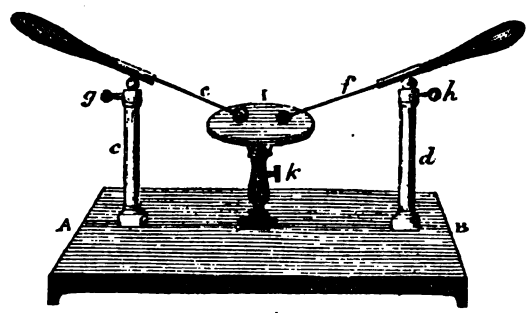
Stands of a circular form, and with raised mouldings, fitting close to the bottom of jars, are better than any other; but they are the most expensive.

For coating jars with tin-foil, we find nothing makes it adhere better than thin paste; a *very* small quantity of which is sufficient for the purpose.

Fitted up in the manner just described, the Leyden Jar is ready for use, and more easily managed than in any other form. Its size should correspond with that of the Electrical machine with which it is to be associated; a knowledge of which is soon acquired by practice. With a powerful machine, (an eighteen or twenty-four inch plate for instance,) one jar containing 350 to 400 square inches of coating (on each side) is sufficient to illustrate an extensive series of electrical phenomena.

But before we begin to experiment with the Leyden jar we must provide a *jointed discharger*, which consists of two slightly-curved brass wires *b*, terminating in balls of the same metal, about three fourths of an inch in diameter, and moving on a joint which is cemented to a glass handl. The action of this instrument is similar to that of a pair of callipers, and is therefore, applicable to jars of any size. It is used for effecting a communication between the inside and outside coatings of jars; enabling the operator to discharge the whole of the accumulated electricity at any moment, and without fear that it will pass through his own body.

Another article of apparatus, equally useful as that just described, is called the *Universal Discharger*. When cheapness is studied, it may be made entirely of well-dried wood, which, with proper care, will answer the purpose quite as well as more costly materials. Its usual form and mode of construction is, however, as follows. A B is a piece of mahogany, say



about 16 inches long by 6 wide, and one inch thick, into which two glass pillars, *c d*, are securely fixed by screws; a plan we recommend whenever it can be adopted, as it adds greatly to the portability, and, in packing, to the security of apparatus. On the top of each of these insulating pillars is a brass cap, to which is connected, by means of a ball-and-socket joint, or some other contrivance affording both a vertical and horizontal motion, a piece of spring tubing, through which passes a brass rod (*e* and *f*) terminating at one end in a glass handle, and at the other in a brass ball, or point, or a pair of forceps, as circumstances may require. *g h* are small brass hooks or balls, by which the opposite sides of a Leyden jar are made to communicate with the rods *e f*. I is a small mahogany table, about four inches in diameter, which is adjusted at any required height, by means of a screw *k*. A small screw-press is sometimes used instead of the table.

By the combined arrangements of this apparatus, a charge of electricity is made to pass through any particular substance which is submitted to its action by being placed on the table, or fixed in any other way most convenient, between the extremities of the rods *e f*.

Returning now to the Leyden jar, we may commence with the following illustration of its principle. Let its inside coating be made to communicate with the (positive) conductor, and which may be effected by placing in contact with it the ball at *e* (see the fig. above); or, if that cannot conveniently be done, they must be connected by a chain. On turning the machine, (and two or three revolutions are sufficient,) the positive electricity excited by it is conveyed to the interior surface of the jar, where it equally diffuses itself over those parts of the glass covered with tin-foil. Now let the operator with one hand touch the ball at *g*, which in the manner already described

mmunicates with the outside of the jar, and with e other hand the ball at *e*, and at the instant of ming in contact with the latter he will experience painful sensation in the wrists, elbows, and chest. ais is termed an *electric shock*; and although by its ddenness it creates momentary surprise, and is to ost persons unwelcome, yet its effects, generally eaking, are very transient. The shock thus given the human body is occasioned by making the arms d those parts of the body interposed between them e medium of communication in effecting an electri- discharge; the electricity accumulated within the making its escape by that course to the outside, d the electrical equilibrium of the jar being thereby tantly restored.

Under the circumstances just mentioned, let it be nembered that the jar must communicate with the rth, that is, it must not be insulated. This is a ndition to which we have already alluded; but so portant is it in the management of Leyden jars at for a moment we recur to it again.

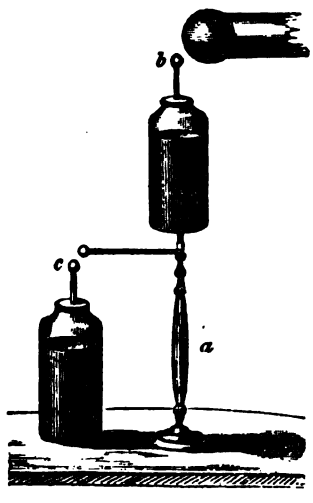
It must never be overlooked by the electrical stu- nt that in all his manipulations he has two oppo- te kinds (or states) of electricity to deal with, and ecial provision must always be made for that which resents itself, as it were, unbidden, as well as for at to the production of which his exertions are more mediately directed.

For example: a common (plate) electrical machine xed in the usual manner, is said to communicate ith the earth; because, the table being in contact ith the floor, the floor with the walls, and the latter ith the earth, there is no difficulty in obtaining a upply of electricity from that inexhaustible store- ouse. But let us suppose the same machine to be nsulated, that is, cut off from electrical contact with he earth, by means of a stand or table supported on lass legs, and we then find it impossible to obtain rom it any great quantity of electricity; for the ubbers being soon exhausted, the action of the nachine, at first very feeble, eventually ceases. On onnecting the machine by a chain, or other good conductor, with the floor or wall of the building, a upply of electricity will however be immediately ob- tained.

Precisely the same conditions as are here indicated, must be observed when, for any particular purpose, we wish to accumulate and to retain electricity in bodies; as in a Leyden jar for instance. We will suppose a jar to be in a perfectly neutral state; that is, to contain a certain portion of electricity which it has, in common with other surrounding objects, re- ceived from the earth or the atmosphere. We wish this jar to become the depository of a quantity of electricity, much greater than that which it ordinarily contains; and to effect our object, we place the coat- ng on its inner surface in metallic contact with the electrical machine; and then, if the coating on the outside of the jar be in communication with the earth, by working the machine the jar will receive the accu- mulated charge; but if the outside of the jar do not communicate with the earth, no electricity will pass from the machine to the inside.

Hence therefore we conclude, that if the terms *positive* and *negative* denote two distinct *kinds* of electricity, hat kind, whichever it may happen to be, rendered ctive by the agency of a machine, can be accumu- ted and retained in no other way than by the simul- aneous accumulation and retention of a similar antity of the opposite kind; the latter presenting elf without any effort on the part of the operator. r if *positive* and *negative* be supposed to imply dis- ict and opposite *states* of electrical excitation, the former answering to its excess, and the latter to its deficiency, then is it manifest that one side of the Leyden jar can be made to receive *more* than its ordinary share only when means are provided for the simultaneous escape of a similar quantity from the other side, which will consequently contain *less* than it did before its electrical equilibrium was disturbed.

The following experiment will illustrate what we have been saying, and, as we hope, render intelligible a subject which, to beginners, is generally difficult and perplexing. *b* and *c* are Leyden jars, as nearly as possible of the same size, and similarly fitted up. *a* is an insulating stand, to the top of which one of the jars, *b*, is attached. The other jar is not connected with the stand, and, in the experiment we are going to describe, it must be placed on the table.



If the knob of the mounted jar be brought near the conductor, as represented in the figure, and that of the other placed at the same distance, say, about half an inch, from the end of the projecting brass rod, which is in metallic contact with the outside coating of the jar *b*; on working the machine it will be seen that whenever a spark passes from the conductor to the inside of *b*, at the very same instant a similar spark appears to leave the outside of *b*, and pass to the inside of *c*; and after a few turns of the machine, both jars will be equally charged. Having by means of the discharging rod (see page 116) restored the electrical equilibrium of both jars, and which we recommend should always be done, as the surest protective against accidental shocks, before any other experiment is attempted, let the jar *b* be restored to its former position near the conductor; when, on turning the machine, it will be found that no sparks will pass from the conductor to the jar, and on examining the latter, it will be manifest that no charge has been communicated to it. Let everything remain as just described, excepting that the projecting rod be made to communicate with the earth, and which may be done by attaching to it a piece of chain, or by touching it with the hand. In this case the jar *b* will receive a charge as promptly as if it were standing on the table.

It is a wise, a salutary, and a laudable provision of the church's discipline, that she sets apart, and consecrates, by solemn religious rites to God's glory, the places which she intends for his worship; and by outward signs of decency and reverence, of majesty and holiness, impresses them with an appropriate character, which, whilst it redounds to the honour of God, operates also with no mean or trivial influence on the minds of His people. Connected with this character, and in some degree generated by it, together with an awful veneration for the great Proprietor, a certain secret sense of serene and holy pleasure is diffused over the pious and meditative mind, as soon as the feet cross the threshold which separates the house of God from common places. We feel with delight that we are on "holy ground;" and a still small voice within, as we draw near to "worship God in the beauty of holiness," answers in the words of the Apostle at the sight of the "excellent glory," "It is good for us to be here."—Bishop Mant.

KEEPING INDEPENDENCE.

THE people of the United States of America have but one day in the whole year which they celebrate as a holiday or festival: the day on which, to use an expression of their own, they "keep Independence." This national festival is annually celebrated on the 4th of July, since it was upon that day, in the year 1776, that their famous Declaration of Independence was signed, sealed, and executed, by fifty-five of the people's representatives, from the thirteen revolted provinces, that afterwards formed the confederated republic of the United States. Without canvassing the merits of the American revolution, it will readily be conceded that these said "signers" were bold and intrepid men; who, by thus promulgating this treasonable document, were fearlessly braving the vengeance of their rightful sovereign, the king of Great Britain.

It must not be taken for granted that this festival is celebrated in the old-fashioned forms of kingly governments, or of those ancient countries whose inhabitants conceive the superlative of all enjoyment to consist in "feasting and fiddling," and in getting "royally" intoxicated with wine or strong drink. No such thing! Our modern brethren of the United States reckon upon making their's, "The feast of reason and the flow of soul:" whether they invariably succeed or not is another matter.

The celebration of the 4th of July may be said to be truly *national*, since it is neither confined to the metropolis of the union, to the capital cities of the several states, nor to the whole of the larger towns and cities, for every county throughout their vast extent of territory, celebrates "Independence" in its little county town; while there is scarcely a township (even in the most out-of-the-way settlement) that does not get up a celebration on the annual return of INDEPENDENCE DAY. In large towns or cities, public functionaries commonly occupy prominent situations in the processions and pageants; for to them, as a matter of course, belong the arrangements of the chief business of the festival, and hence we find them self-appointed to the principal offices of honour and dignity.

There are two things particularly patronized at these celebrations, namely, "soldiering" and "speechifying." The former for the most part consists in parading awkward companies of raw militia, and oddly-accoutred parties of volunteers. Orations, equally marvellous and "lengthy," are listened to with a becoming reverence and composure, for it would be considered extremely indecorous in the audience to express any audible signs of pleasure or approbation; —dissatisfaction, as a matter of course, being out of the question. It certainly does appear—when we look back to "the days that tried men's souls"—that both these modes, that is "soldiering" and "speechifying," are equally appropriate on these celebrations of Independence; since the soldiers and the legislators (public orators) of '76 both materially contributed, in their respective capacities, towards that independence which the people now celebrate as a great national festival.

Those who muster on these occasions under the title of soldiers, (no matter how inapplicable the term may be,) give proofs of their patriotism in the profuse waste of gunpowder; for in addition to rifles, muskets, and rusty fowling pieces, everything bearing the faintest resemblance to a cannon, mortar, or swivel, is pressed into the service of the young republicans; to proclaim, in voices of thunder, that Independence *Day has again returned.* Where nothing resembling "big guns" can be had, the store-keepers are applied to for the loan of their 56 lbs. weights; the cavities of which are filled with gun-powder. These weights, however, are rather sorry substitutes for long thirty-sixes, or ten-inch mortars; for the hollow spaces within the said weights are both short and narrow; and, to crown the difficulty, they happen to be destitute of touch-holes. To persons of moderate capacities this would seem an insurmountable obstacle,—whereas with an ingenious Yankee it can hardly be called a difficulty. To witness them loading and priming, for they load first and prime afterwards, one would think they had studied the art of mining and blowing up of rocks; for upon the identical plan of charging and discharging a hole perforated in a solid rock, do they manage their 56 lbs. weights. The recoil, however, is sometimes, as they term it, *considerable*; for if they happen to plug up the cavity a little too tightly, so that it becomes a doubtful matter in which direction the force of the explosion shall escape, even should the struggle terminate in favour of the artificial stoppage giving way, as was intended, the square or conical 56 lbs. weight is sure to recoil in an opposite direction, to a distance quite indefinite, (as if exulting in the principle of universal freedom,) and not unfrequently penetrates the slight wooden frame-work of some startled citizen's dwelling. Fingers, and arms, and legs, and even lives, are commonly sacrificed in the ardour of this species of celebrating independence.

In every assembly, on occasions of this nature, whether in city, town, village, or thinly-inhabited township, an "orator of the day" is appointed, (at some previous meeting,) to hold forth to the assembled cititizens. These orators, as already stated, are appointed at some previous meeting; since it would be absurd to expect that a three or four hours' oration, befitting so distinguished an occasion, should be prepared on the instant; and particularly when they have to be manufactured by persons who are not first rate performers in this sort of speech-work. A month or two is usually allowed for preparation; so that a person of ordinary acquirements may manage to cobble out a speech, (making sundry extracts from old printed "Independence Orations,") which he never attempts at delivering extempore, but reads it from some wagon or popular rostrum, in the best manner he is capable.

The people usually assemble in the open air, or in rude arbours formed of the branches of forest trees. When the meeting has been duly organized, some one, previously appointed, opens the business of the day with a long prayer, which very often appears notoriously out of place. In rural districts "the ladies" join in these celebrations; when cider is plentifully supplied by some calculating farmer at a half-penny per glass; while those who can afford it, and feel disposed to spend their three-pence, are accommodated with a weak infusion of hyson-skin: and this they call celebrating their independence in a patriotic and national manner.

THE Passover was observed on the fourteenth day of the month Nisan; on the fifteenth day of the same month commenced the feast of unleavened bread; and on the sixteenth day, that is, "the morrow after the sabbath," the Jews offered up to God the *Omer*, or the sheafs of first fruits of the barley harvest, which was cut and carried into the temple with much ceremony. St. Paul, in speaking of Christ's becoming the first fruits of them that slept, probably beautifully alludes to this observance, which was celebrated on "the morrow after the sabbath," literally, Easter day.—*Notes to Bible Narrative.*

RECREATIONS IN NATURAL PHILOSOPHY.

No. XII. On the Elasticity of Air.

The elasticity of the air is one of its most prominent features. A cushion filled with air yields to the weight of the person sitting upon it, but recovers its form when the weight is removed. A bladder partly filled with air, and exposed to the heat of a fire, will swell out until it bursts. In a boy's pop-gun the air is compressed between two pellets of tow, until such an elastic force is obtained as to overcome the friction of the pellet at the end of the tube: the air, in being released, expands with great force, and thus imparts rapid motion to the pellet. The game of foot-ball derives all its interest from the elasticity of the air enclosed within a horse's bladder. The air-gun is perhaps only an improved pop-gun: the air is strongly compressed in a reservoir, and being suddenly liberated, it projects a bullet with great force. The pea-shooter may perhaps be cited as another instance: the air suddenly blown into the tube imparts a great velocity to the pea. If two pins be thrust at right angles, thus +, through a green pea or a pith ball, it can be supported in the air, apparently upon nothing, by blowing through a piece of tobacco-pipe held in the mouth in a vertical position, and placing the pea a little above the upper end of the pipe. The pea is supported by the current of air propelled through the tube: the points of the pins should be covered with sealing-wax, to prevent any accident. Indeed with a little address the pins may be dispensed with altogether, their only object being to give stability to the pea, and to retain it within certain limits of the end of the tube.

But we must put away our toys, and enjoy a little sober philosophy. Air is perfectly elastic: let us inquire why it is so. This will lead us to a very beautiful and simple law, which regulates the elasticity of aeriform bodies.

All substances which exist upon, in, or about the earth, are included in the general comprehensive term *matter*. Matter exists in three states, viz., the solid state, the liquid state, and the gaseous or aeriform state. Matter is supposed to consist of little round bodies called *atoms*, which are so extremely small that no philosopher has ventured even to guess at their size*. A celebrated microscopic observer tells us that he has found animalculæ so small that he could take up a million of them on the point of a needle; but it is more than probable that an atom of matter is a great deal smaller than one of these million of insects. However, we will not talk further about the size of an atom, since we can arrive at no just idea of it. When these atoms are firmly held together, so as to require great force to separate them, we get a solid: when they are less firmly united, so that by a very slight disturbance we can displace them, we get a liquid. This force of attraction, which unites the atoms of solids and liquids, is called the *attraction of cohesion*, which has already occupied our attention in this course. See *Saturday Magazine*, No. 392. Now this cohesion is altogether absent in airs. If, for example, we put a lump of ice into a small copper boiler, and fasten down the lid, so that nothing can get in or out except heat, (for that gets everywhere, and we cannot confine it,) and then put this boiler on the fire, the solid ice will soon become water. Now in the ice the attraction of cohesion is much stronger than in the water, and by continuing the heat we shall destroy the cohesion altogether; the water will become steam, the particles of which not only have no attraction for each other, but they actually repel each other; and the more so in proportion to the amount of heat contained among them. This repulsion soon becomes so great as to burst the boiler, with a tremendous explosion. Hence the use of safety-valves, the nature and use of which we will consider more particularly in another article.

Now this repulsion among the atoms of aeriform bodies gives us the reason why they are so minutely and so perfectly elastic. They are always seeking to fly off from each other, so much so that if we were to let a quart of air into an exhausted† vessel, capable of holding a million quarts, this vessel would not only be filled, but the air would press in all directions upon its internal surfaces in their attempt to extend themselves further. Nay, this struggle is constantly going on in every vessel which is full of air, such as we are in the habit of calling *empty*. In every vessel containing air there is a contest between the enclosed and the external air. The latter seeks to get into the vessel, and the former opposes the entrance; and were it not for this contest many a close vessel full of air would burst, in consequence of the particles or atoms of the enclosed air seeking to extend their limits. But this catastrophe does not occur in consequence of the external air exerting a pressure in all directions of fourteen and a half pounds upon every square inch of surface; but if a thin square glass vessel be firmly and accurately closed, and placed under the receiver of an air-pump, it will burst when the pressure of the external air is removed. When the external air is present it does not burst, because the enclosed air is as dense as that without, and therefore exerts as great a pressure in all directions, and these two pressures, the internal and the external, being equal, no effect ensues.

It may probably be asked why the air, exerting, as it does, so great a repulsive force among its own particles, does not fly off into space, where we may suppose each atom would have room enough to be solitary, without any intrusion on the part of its companion atoms. The reason is, that all the atoms of air being subject to the attraction of gravitation, which confines them within certain limits of our earth, that attraction is so much stronger than the repulsion among the aerial particles. The nearer the air is to the surface of the earth, the more is it subject to gravity; and, besides this, the lower strata of air have to bear up against this attraction for the upper strata, and accordingly we find that the air at the surface of the earth is more dense than at the tops of high mountains, and consequently it exerts a less pressure in the latter than in the former case.

The beauty of this admirable contrivance is well calculated to awaken within us a lively sense of the wisdom of the great Creator, not only on account of the Divine skill to contrive, to execute, and to preserve the stability of His works, when contrived and executed, but also in allowing us, by the study and contemplation thereof, to understand them;

> To grow familiar, day by day,
> With His conceptions; act upon His plan,
> And form to His the relish of our souls.

The perfect elasticity of airs has enabled philosophers to arrive at a very beautiful and simple law, viz., that a volume or bulk of any gas depends upon the pressure which it supports, and that, at the same temperature, all gases occupy the same volume under the same pressure. But this law is so very important that we must devote a whole article to its demonstration.

* Dr. Thomson has shown by experiment and calculation that an atom of lead does not weigh *more* than one 310,000,000,000th of a grain, and an atom of sulphur not *more* than one 2015,000,000,000th of a grain.

† A vessel is said to be exhausted when it is deprived of air. A vacuum or empty space then exists within the vessel.

ON WRITING MATERIALS, (*concluded.*)

No. XI.

PEN-KNIVES.—The extraordinary demand for steel pens within the last few years, in which the aid of a pen-knife is not called for, would have induced us to think that the use of quill pens must have greatly diminished, and that pen-knives must likewise have become much less in request. But such does not appear to be the case. We rejoice to find that both quill pens and steel pens are manifesting their utility by increasing in their supply. Long may this continue, and long may the pen be the pioneer for preparing the way for improvements in the ages that are to come.

The manufacture of the pen-knife is but one among a vast variety of processes which constitute cutlery. We may probably hereafter enter somewhat fully upon the iron manufacture generally, and will therefore, at present, give merely the outlines of the processes necessary for the manufacture of a pen-knife.

Sheffield is the great workshop which supplies almost all the world with knives. The hammering of the steel bar which is to form the blade, is carried on in the *smithy*. A boy is employed to keep several bars of steel heated, or being heated at one time; and he hands them to the striker or hammer-man, one at a time, so that he is kept constantly at work. A pen-knife-blade is formed by two heatings. In the first place, that part which we call the blade is fashioned by hammering, and then chopped off the end of the rod. It is then again heated in the forge, taken up by a pair of tongs, and the part which is called the *tang* is formed; this tang is the part by which the workman holds it while grinding the blade, and which is ultimately inserted in the handle. The whole is then smithed, or smartly hammered after it has ceased to be soft, in order to close the pores, and produce the greatest possible degree of density. The nail-mark—used when "opening" the pen-knife—and the maker's name, &c., having been struck upon it, it is ready for hardening. The steel springs for the back, and the iron casings for the inner sides of the handle, are made by workmen ranking a degree lower than the blade makers.

When the blade is properly hammered, it is next hardened and tempered,—processes which, though extremely simple in themselves, require the nicest tact and judgment, as upon them the excellence of the future knife greatly depends. Steel is commonly hardened by being plunged, while red-hot, into cold water, and afterwards tempered by being heated until the surface assumes a particular tinge, varying from a light straw colour to a deep blue, according to the nature of the instrument which is being made.

After the blade has been hardened, it is, in most cases, carried directly to the grinding mill, or wheel, for the purpose of being ground. Before the extensive introduction of steam power, the grinding wheels were turned by water; but now steam has usurped the place of water, in this as in many other instances. The grinding stones revolve on horizontal axes, and are of various sizes for different kinds of work. The blade is frequently wetted, and applied to the stone in a way which may be easily conceived. The pen-knife when ground, is worked on a trundle or *glazer*, which is a wooden wheel about four feet in diameter and two inches thick. On the edge of this wheel is a coating of soft metal, consisting of lead and tin, about an inch in thickness; and on this, powdered emery is applied.

The next process is that of *polishing* or *buffing* the blade, which is done on a wheel similar to that last described, except that the surface of the wheel is covered with buff leather instead of emery. On this leather some very fine polishing powder is applied, and the blade polished.

The blade now passes into the hands of the workman who is to finish it and finally place it in its handle. The workman wears a breast-plate in front of his body, fastened round him with straps: the breast-plate contains a piece of steel with several small indentations. These are to receive the blunt end of a borer which is to make small holes for rivets, and for the hole for the pin upon which the blade works at the joint. An ingenious instrument called the *boring-stick*, gives a rapid rotatory motion to the borer, which is a sharp instrument, and thus enables it to penetrate the metal applied against the sharp end of the borer.

The materials employed for handles are almost innumerable. Gold, silver, ivory, mother of pearl, tortoise-shell, horn, bone, cast-iron, &c., are employed, according to the costliness of the article. The forms of handles are almost as various as their materials, as is well known.

When the blade and the handle, with its metallic lining, spring, &c., are properly made and the holes bored, the whole is pinned together, (loosely at first, till, all the parts being exactly fitted, the knife is found to work properly,) with pieces of wire, and rivetted with the hammer. The sides of the handle, if of horn, ivory, or shell, are then filed and scraped, and then polished on a wheel covered with buff leather. A small shield, either of silver or some other metal, is frequently inserted in one side of the handle. The groove or depression which is to receive this shield is made in a manner somewhat resembling that in which the holes are bored.

We may state, as an instance of the rapidity with which pen-knives must be made, that we have purchased one at a cutler's in London for *three-halfpence*. The handle was of cast-iron, and the rivets and spring firm and complete. It is needless to say, that as a cutting instrument its merits were but slight; but we mention it as a proof of what may be done by division of labour and the application of machinery. The raw material, the workmen's wages, the carriage to London, and the profit of the shopkeeper, must all be paid out of this three-halfpence!

Pounce.—Writing masters are in the habit of rubbing the powder of scuttle-fish, or of gum sandarach, upon writing-paper, in order to make it less absorptive of the ink. This gives a sharp, precise, and determinate character to the writing. For those who are curious in the art of the pen, pounce is very useful in concealing errors which have been scratched out with a pen-knife. The action of the latter upon paper is to remove the size and to allow the ink to diffuse itself into an ugly blot: this, however, is altogether prevented by the application of pounce.

OF CRIMES AND PUNISHMENTS.

IF those whom the wisdom of our laws has condemned to die, had been detected in their rudiments of robbery, they might, by proper discipline, and useful labour, have been disentangled in their habits; they might have escaped all the temptations to subsequent crimes, and passed their days in reparation and penitence; and detected they might all have been, had the prosecutors been certain their lives would have been spared. I believe every thief will confess, that he has been more than once seized and dismissed; and that he has sometimes ventured upon capital crimes, because he knew, that those whom he injured, would rather connive at his escape than cloud their minds with the horrors of his death.—JOHNSON.

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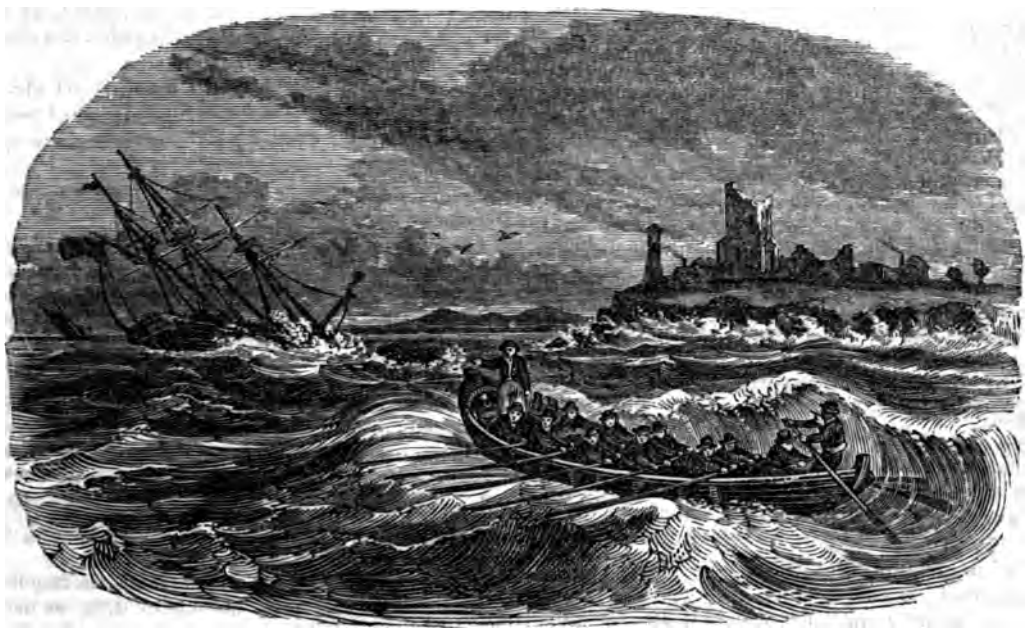
A BRIEF HISTORY OF NAVIGATION. PART V.



A LIFE-BOAT GOING TO THE ASSISTANCE OF A SHIP IN DISTRESS.

MODERN NAVIGATION.

Now, while on high the freshening gale she feels,
The ship beneath her lofty pressure reels.
The auxiliar sails, that court a gentle breeze,
From their high stations sink by slow degrees.
The watchful ruler of the helm no more
With fixed attention eyes the adjacent shore;
But by the oracle of truth below,
The wondrous magnet, guides the wayward prow.
The wind, that still the impressive canvass swelled,
Swift and more swift the yielding bark impelled.

A SHORT SKETCH OF THE PRINCIPAL VOYAGES PERFORMED IN MODERN TIMES.

In the preceding divisions of the subject, we have endeavoured to give a general view of the progress of naval enterprise down to about the year 1500. That memorable period formed a marked and most eventful epoch in the history of the human race. The invention of printing, and the important circumstances connected with the Reformation, separated what may indeed be termed the "dark ages" from modern times; and a third class of events, which served to make that boundary still more decisive, was the discovery of lands before unknown to the nations of Western Europe.

The progress of these discoveries we shall now give a general sketch of, without entering into any details. This is all that our limits allow of: further information must be sought in works which are devoted to the narration of single voyages, each of which voyages often furnishes matter for volumes.

In 1497 Sebastian Cabot discovered the main-land of America itself, near Newfoundland. This person received a royal commission from Henry the Seventh, to discover new countries, and trade therein. He seems to have been of English origin, but brought up at Venice, which having left, he lived for some time at Bristol. The English had been induced to send Cabot out, from jealousy of Spain and Portugal, which countries had thriven by pursuing the American trade. Not but that opposition to the Pope had some influence on English adventure; the Pope having been very free in giving away the New World to the inhabitants of the Peninsula. The English set out, however, without such patronage.

About fourteen years after this event, some adventurers in London endeavoured to seek out a passage to Cathay (the modern India) and China, by sailing to the north-west. About the year 1499 took place the voyage of Vicente Yanez Pinzon, one of the earliest companions of Columbus. In sailing to the south-west, over the Atlantic Ocean, he met with a violent tempest which forced him upon the coast of Brazil, the people of which coasts took the boats for the young of the ships. They were alarmed by the depression of the pole-star, and astonished and excited at the sight of the constellation called the CROSS. Here they discovered the mighty river Maranon, now called the river of Amazons, from the notion that some early travellers had asserted that they saw armed women roaming about upon its banks. The water of this river makes the sea fresh for many leagues from the shore.

In the year 1513 Balboa, a Spanish navigator, first crossed the Isthmus of Darien, which joins North and South America, and saw the vast Pacific ocean rolling beneath him; and in 1520 Magellan, a Portuguese, who had the command of a Spanish expedition, sailed towards the South Seas, and explored the southern part of the American continent. The land separated by the Straits of Magellan he named *Tierra del Fuego*, or *land of fires*, from the vast number of fires seen during the night in this country.

The strait named after himself being passed through, Magellan saw the South Pacific ocean before him. This voyage of Magellan was attended by many important results. It showed that the Pacific and Atlantic oceans were united, and likewise ascertained the boundary of the

American continent. Magellan was unfortunately killed at the Philippine islands; but his companions in the Vittoria sailed on to the Moluccas, where they astonished the Portuguese by their presence. They then sailed on to Europe, and arrived at Lisbon, after a voyage of three years, which time they had taken up in sailing round the earth: so that the fact of the earth being a globe could never after be doubted.

In 1501 Amerigo Vespucci sailed across the Atlantic, and discovered some part of Brazil, through which circumstance, and the difficulty of attaining historical accuracy on such matters, he has been by some considered as the discoverer of America, which has been named after him. But his chief merit, whereby he was so honoured, seems to have been that he first gave the world anything like a circumstantial account of the earliest voyages to America.

Now it is manifestly impossible that such a train of extraordinary events, all occurring within a period of about fifteen years, could fail to produce a powerful effect on the nations of Europe. A new train of ideas was opened up; the feudal and baronial customs of England and other countries, which had been for some time on the decline, received a further blow by these discoveries; since the mercantile classes found new channels, in which to dispose of the manufactures of their own country, and to receive the produce of the newly-found lands in return; while the manufacturer and artisan found a new field for their labour, in providing for the foreign markets. Hence it was by such events that that large section of the community, which is known as the "middle classes," attained an influence in the state, which they did not before possess.

It must not however be supposed that this eventful change in European history was productive of unalloyed good; for men, especially when ignorant and excited, will too often abuse the good gifts which Providence bestows upon them; and the love of wealth which, when kept within judicious bounds, is one of the elements of a nation's prosperity, seems to be a curse as soon as it becomes a passion. The Spaniards, when they had seen the natural wealth of the Peruvian and Mexican countries which they discovered, gave vent to their insatiable avarice, and gained possession of vast treasures by the commission of atrocities, at which justice and humanity recoil. But yet did it not conduce to the welfare of Spain: for the acquisition of so much gold without giving commodities in return, engendered a spirit of indolence, which sapped the foundation of the nation's prosperity, and afforded to the rest of Europe a practical illustration of the lesson, that "Industry is better than gold."

Early in the sixteenth century, Cortes had visited and conquered Mexico. In 1512 Ponce de Leon led his followers out to the New World, with the hope of discovering the far-famed Fountain of Youth, and first visited the tract now called Florida, which was so named in consequence of the beautiful appearance of the country. The Portuguese had, a few years before this, sent out an expedition to explore a north-west passage to India, under Cortereal, which being wrecked, his brother Gaspard went out in search of him, and was lost also in the sea at the entry of the St. Lawrence river, which was for some time after called "the Gulf of the brothers." This sea, afterwards called Hudson's bay, they thought to be between Africa and America. But the Portuguese had now acquired for themselves a vast extent of territory in South America, now called Brazil; in proceeding in an expedition to which parts the celebrated Diaz lost his life, between Brazil and the Cape of Good Hope. The Portuguese owned at this time almost the whole extent of the East Indies and the west of Africa, but all these, with one or two exceptions, they have now irrecoverably lost.

In the year 1527 we read of the English making an attempt to get to Cathay by the North Pole. Soon after this we find Drake and Frobisher, celebrated English seamen, advancing the nautical art and a knowledge of the world; the two being naturally coeval with each other. About this time Drake first sailed into the Pacific Ocean, and discovered the tract of country now known as California. From this place he steered on westward, and arrived at the Spice Islands, and there began a lucrative commerce. He visited in his passage homewards Sierra Leone, and arrived in England in 1580, having been absent nearly three years. Drake was the first Englishman who circumnavigated the globe. Cavendish, another spirited adventurer, soon after pursued a similar route.

About this time, Newfoundland was visited for commerce and fishery; and the tract of country now called Virginia, was so named in honour of queen Elizabeth.

In the year 1542 we begin to hear of Japan, which was first visited by the Portuguese: and about the year 1563 Juan Fernandez discovered the island named after himself on the western side of South America. This island is celebrated as the abode of Alexander Selkirk, a shipwrecked mariner; found here, after four years' solitary residence, by Captain Dampier, at the end of the seventeenth century. Selkirk was the original of the celebrated novel, called "Robinson Crusoe." Sir Walter Raleigh, likewise made some figure in nautical affairs about the end of the sixteenth century.

In the year 1553 Sebastian Cabot, the son of the former Cabot, and who had been named by Edward the Sixth, "grand pilot of England," was called upon for his advice and assistance in an expedition to discover a passage to China, by way of the north-western seas. This expedition he did not accompany, owing to his advanced age. The expedition was never more heard of: it perished miserably, as alluded to by the poet:—

> Miserable they,
> Who, here entangled in the gathering ice,
> Take their last look of the descending sun;
> While full of death, and fierce with ten-fold frost,
> The long long night, incumbent o'er their heads,
> Falls horrible. Such was the Briton's fate,
> As with *first* prow (what have not Britons dared!)
> He for the passage sought, attempted since
> So much in vain.——

The general objects of the northern expeditions of late years, have been to reach the pole, and to find a passage to the left to China. For about three hundred years past, this has been an object with all the chief nautical nations of Europe.

Though the Spaniards, after having been enervated by wealth, did very little towards fresh geographical discoveries and nautical science, yet we read of their attempting, under Gomez, to get to the Spice Islands by this route: this was in the year 1524. During the reign of Henry the Eighth, several attempts were made by the English. Expeditions were afterwards fitted out under Davis, Baffin, Hudson, and many others, which answered not the end in view; but increased the geographical knowledge of the northern continent of America; the various places of which have been named from the early discoverers.

The end of Hudson was lamentable. He had been sent out by the London merchants in the year 1608; and having discovered and explored the great inland sea, called after him "Hudson's Bay," he was left by his mutinous crew to perish on its banks. The company, afterwards known as the Hudson's Bay Company, for trading in furs, was not formed till the year 1668.

This spirit of enterprise and action in the north existed in England until about the year 1616, when it declined; nor was it revived until the year 1676, when Captain Wood was sent out by the Admiralty.

In the year 1594, the United Provinces of Holland having become independent of the crown of Spain, made an attempt to explore the north-western regions of our hemisphere: and, as they were a great trading people, they hoped, in common with the English, to shorten the passage to India. Many attempts had been made to have communication with India through Russia and Persia; but this was found more expensive than the ancient mode of carriage, by the Arabian merchants. Hence their desire for a north-west passage. Denmark sent out an expedition for this purpose about the year 1619; and a solitary attempt was made by some enterprising English individuals, in the year 1631.

The commercial spirit of the Dutch soon raised them to be an important naval power. After the discovery of the passage to India round the Cape of Good Hope, the Dutch entered with energy into the establishment of mercantile arrangements with the countries of the east; and in so doing, they necessarily had to pay great attention to the construction and general fitting up of their shipping. As they acquired power, so did their ambition increase; and they divided their naval exploits between trading to the east, and humbling the Spaniards in the west. In 1639 the celebrated Dutch Admiral Van Tromp, with a fleet of only eighteen vessels, forced a Spanish fleet of eighty-nine sail to retire discomfited. At and about the beginning of the seventeenth century, the Dutch had great power and possessions in the East Indies, and on the coast of Africa; which has been since greatly interfered with by the French and English. New Zealand was discovered by them in

1642, during an expedition under Tasman, a navigator sent out by Van Diemen, governor of the Dutch possessions in the East. Tasman's first discovery, after setting sail from Batavia, was the land now called Van Diemen's land, which is at the south of Australia, which was likewise discovered by the Dutch.

About this time, 1618, expeditions were fitted out from England for African discovery. The French took up the subject about eight years after; after which it slept till the year 1720, when the subject was revived and pursued with ardour by Park, Denham, Clapperton, &c., in times more contiguous to our own.

During the sixteenth century it is remarked that, as the zeal of the Spanish navigators declined, that of Russia increased. Moreover, the Russians have, on many occasions, shown themselves alert to advance the cause of maritime and geographical knowledge. By them was decided the important question, that Asia and America were separated by a breadth of ocean, now known by the name of Behring's strait. This question was much discussed in Holland, when Peter the Great dwelt there in 1717. The more pressing cares of government prevented him from giving attention to this question; but in his last illness, he enjoined its fulfilment upon his successor. The Empress Catherine, in the year 1735, originated the expedition; and the object of it was effected in 1730, by Captain Behring, whose name has been given to the passage. The Russians entered upon another expedition in 1741, to explore towards the north-east, and meet the more western nations of Europe, in their advances to the north-west; and at the same time another expedition went southward to Japan.

The French expedition under Cartier, in 1534, had conquered and subjected to the crown of France, all the countries round the St. Lawrence, in North America; all which were taken by the English, about the year 1763. In consequence of the success of the French in their voyages of discovery, while occupying Canada, the English were incited to send Commodore Byron, in the year 1764, on a voyage of discovery to America; and soon after, about 1783, France, with a like spirit of emulation, despatched an expedition for a similar purpose, under La Pérouse.

In the year 1773, north-west discovery was again pursued under the conduct of Captain Phipps, who got to about 81° north latitude. In 1776 Captain Cook was sent out to sail into the Pacific, and thence into the Atlantic. He performed several voyages, the tracks of which are usually laid down on full-sized globes and maps. After Cook, the north-west coasts of America were visited at different periods by Meares, Vancouver, and Kotzebue; and though the limit of discovery was not then extended beyond Icy Cape, the shores were more minutely examined, and an useful commerce established with the natives. Captain Cook completed the survey of Australia; and since his time no material discoveries have been made in the South Seas.

Captain Bligh, in the Bounty, sailed into the Pacific ocean, in the year 1788: upon which occasion a mutiny took place. Many of the men remained behind in the beautiful islands of those seas; who were subsequently seen by Captain Edwards, of the Pandora, in 1791: and in 1808, Adams, one of the last of the mutineers, was seen at Pitcairn's Island, by Captain Folger; and by Captain Staines in 1814.

Attempts have often been made by the British nation, to complete the subject of northern discovery. An expedition was fitted out for this purpose at the beginning of the last century, under Knight and Barlow; but it never returned. A vessel commanded by Captain Scroggs was sent out to look after it about 1720; but it was not until fifty years after that the wrecks of the vessels were found upon Marble Island. The expedition was renewed in 1741, under Middleton; and subsequently several attempts were made to co-operate with Captain Cook in his endeavours to seek a north-west passage. After this, this part of maritime discovery was suspended until 1818; when Parry, Franklin, and Ross, began to make somewhat more extensive advances in the abodes of eternal winter.

Sir John Franklin, accompanied by Dr. Richardson, visited these parts upon two occasions; in 1820 and 1825. In May, 1825, Captain Beechey was sent out by government, in the Blossom, to Behring's strait, to assist and co-operate with Franklin and Parry, if these should succeed in passing along to the north-west, and discovering the long sought passage. While waiting between Asia and America, he surveyed the coasts, &c., with great care and minuteness. Parties from the Blossom passed over-land to the east, and came within 150 miles of the advanced parties of those who were proceeding westward. Beechey arrived again in England in October, 1828, and found that Franklin had returned about fourteen months before him.

The Russians have likewise endeavoured to promote maritime discovery about, and to the north of, Nova Zembla. Under Kotzebue, in 1816, they explored northward of Behring's strait; and they have always afforded every facility in their power towards the discovery of the north-west passage.

SHIPS.

We need not enter into the form, and other details, of modern shipping, as the reader will find an extensive and minute account, by referring to the 69th, 103rd, and 106th numbers of this work: but we cannot refrain from presenting our readers with the following details of the origin of the Life-Boat, and the uses to which it is applied. The Life-Boat forms the subject of the frontispiece of this paper.

So long as life is subject to those vicissitudes and accidents which inevitably threaten it, so long will there be exercise for the developement of humane and benevolent contrivances for preventing, or at least alleviating, distress, in whatever form it may be presented.

The vast and briny ocean is not the least among the sources of human destruction, and has presented, in more ways than one, a wide field for human perseverance. When a "rough sea" is met with far from land, the danger to a ship is not so great as when it occurs near shore; for in the latter case there is imminent danger of her being driven upon shoals, or against rocks, by which the stoutest vessels are shattered.

In such cases, the peril in which the poor mariners are placed is extreme;—often so near the shore that spectators can see the gradual destruction of both ship and men, without possessing the power to render assistance; since any common form of boat dares not venture from the shore to the distressed vessel to afford relief.

A circumstance such as this occurred in September, 1789, when the *Adventure* was stranded on the Herd Sand of South Shields, in the midst of tremendous breakers. The shore was lined by spectators, who saw the mariners drop one by one from the rigging into the waves; and all were lost.

A meeting of the inhabitants was called shortly afterwards, when a premium was offered for the construction of such a boat, as should be able to stand against any tempest, so as to afford a means for sending assistance from the shore to a ship in distress. Mr. Greathead gained the premium, and in 1790 a boat constructed by him was launched, and was found to possess almost every requisite. Its mode of construction was such that it was almost impossible to be upset. The length was thirty feet, breadth ten feet, and depth about three feet. It was exactly alike at both ends, so that it could be rowed either way; and the ends curled upwards to a great height, in consequence of the keel being very deeply convex from end to end. The cross section was likewise a portion of a circle. The sides were cased with a layer of cork, twenty-one feet long, sixteen inches wide, and four inches thick; which were secured with slips of copper: and a somewhat similar layer of cork lined the inside of the sides, the quantity altogether being seven hundred weight. There was provision for ten oars, besides an oar at each end to act as rudder. The internal shallowness of the boat, the elevated position of the ends, and the bulk of cork, left such a small amount of room, that when quite full of water, its stability was scarcely affected.

The efficacy of the construction was put to continual and severe tests off the Yorkshire coast, and gave most complete satisfaction. On one occasion the boat reached a ship in a tremendous gale, brought away the crew, and came safely to shore, crammed with seamen, and completely full of water: this would be almost incredible, were it not that the whole of the cork was above high-water line, and therefore gave it an extraordinary buoyancy.

On another occasion, when the awful appearance of the ocean quailed the hearts of even those who had been accustomed to manage the life-boat, Mr. Greathead himself jumped into the boat, and thereby infused a new ardour into the men; they reached a wrecked vessel, picked the shivering and exhausted mariners from the shrouds to which they hung, and brought them all safely on shore.

1200*l.* from Parliament, 100 guineas from Lloyd's, 100 guineas from the Trinity-house, 50 guineas from the Society of Arts, and a diamond ring from the Emperor of Russia, were some of the rewards which Mr. G. received for his ingenuity.

Various other contrivances for the same object, more or less similar to the above, have been adopted; but at these we can only glance. A plan of Captain Gordon was, to have an assemblage of strips of cork fastened round the outsides of every boat attached to a ship; so that, in case of wreck, the men could take to the boat, and preserve themselves above water by means of the buoyancy which the cork gave to the boat.

Another contrivance, by Mr. Grant, was, to have a thirty-six gallon cask, with some iron ballast, fixed on a wooden bed, and lashed to the cask, and ropes round it for men to hold by. When the hole of the cask was well bunged, it was found that ten men could be supported by it without inconvenience. Such casks it was proposed to have kept on board ship. In other cases, corks, bladders, rafts, and various contrivances have been recommended as means of escape from a ship to the shore.

But a contrivance has been adopted, by means of which a rope can be thrown from the shore to a ship; so as to establish a communication between them. This is the method of Captain Manby, which was perfected some years ago. A shot, shaped somewhat like a pear, was fastened, through the intervention of plaited hide, to a rope which was long enough to reach from the shore to a ship in distress. On the shore was a small mortar, with a provision for shielding the touch-hole from rain.

The mortar was loaded, and the ball inserted; the piece was then fired, and the ball left it with the accustomed velocity, uncoiling the rope, (which lay in a coil or "faker" on the ground by the side of the mortar,) and passing over the ship; so that, in falling, the ball, to which some barbed hooks were attached, would cling to some parts of the rigging, so as to enable the seamen to seize the rope, and so to draw to the ship, boats, hammocks, cots, rafts, or any other contrivance which might be at hand to effect their escape to shore.

It was found that neither iron chains, nor hempen ropes, could, when attached to the ball, bear the sudden expulsion of the latter from the mortar without breaking; but plaited hide was found to answer that object. When the assistance had to be rendered at night, and the ship was not visible from shore, a ball, containing combustible matter, was shot up into the air: it had a lighted fusee attached to it, which was so regulated as to ignite the combustibles at an elevation of about 300 yards. By these means, a splendid light was produced, by which the persons on shore could see the position of the ship, and could place two white rods in a right line with the ship, as a guide. A ball was then fired; but, instead of being solid, it was a shell, filled with combustibles, and having four holes, through which a brilliant stream of light rushed as the shell passed through the air: this enabled the seamen to perceive the rope in its passage, so as to make the necessary exertions towards their own preservation. This very elaborate and ingenious invention of Captain Manby, drew the particular attention both of the House of Commons and of the Navy board.

MODERN PRACTICE OF NAVIGATION.

The nautical art is usually divided into two parts—*Seamanship*, and *Navigation Proper*. The first branch is to be learnt only on board; and comprises all those details which relate to the management of the ship, apart from guiding its course, which is termed *Navigation Proper*.

In this branch of our subject, there are *three* things in particular, which it is the object of Navigation Proper to ascertain:—1. Rate of ship's going, and distance gone.—2. Direction in which the ship is going, or her course.—3. Where the ship is.

1. The rate of the ship's going, and her distance gone, are ascertained by the LOG. The inventor of this instrument is not known. It is first mentioned by Purchas in 1607, as commonly used: it is a quadrantal piece of wood, about 6 inches radius, and a quarter of an inch thick, loaded with lead at its arc, in order to make it stand upright in the water. It is called the *Log-ship*, and has a line fastened to it, about 120 fathoms long, called the *Log-line*, which is divided into spaces called *knots*, and is wound on a reel, from which it runs off freely when used. With this is used a half-minute glass. The operation of using these instruments, is called *Heaving the log*.

When the log is thrown overboard, it remains stationary in the water; and the number of knots marked on the line by pieces of red rag, which pass over the side of the vessel, while the glass is running, shows how many knots, or nautical miles, the vessel is sailing per hour.

The knots are nearly 51 feet on the line, apart from each other; and as 50 ft. 8 in. is the same part of a nautical mile, that a half minute is of an hour; it is clear that the number of knots observed, shows the rate of the ship's going. The log is thrown over on the lee-side of the ship, (that is the side *away* from the wind,) and the first knot is about twelve fathoms* from the log, in order to allow the log to settle and get out of the eddy of the ship's wake. When the red rag at the first knot passes over the side of the vessel, the glass is allowed to run; and the knots are then counted as they pass over, till the sand has run out. The log is heaved every one or two hours.

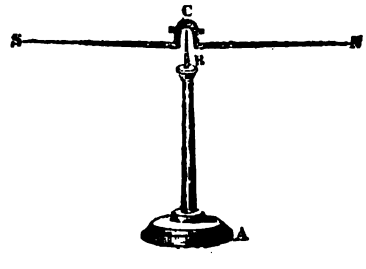
Having thus ascertained the *rate* of the ship's going, the *distance gone* is known by multiplying these knots, or miles, by the hours sailed.

II. The course of the ship is ascertained by the COMPASS. The attraction of the loadstone for iron, was known in very early times; but the polarity of the needle does not seem to have been discovered until the end of the twelfth century. The compass was first used on land; and in progress of time, applied to guide ships on the ocean.

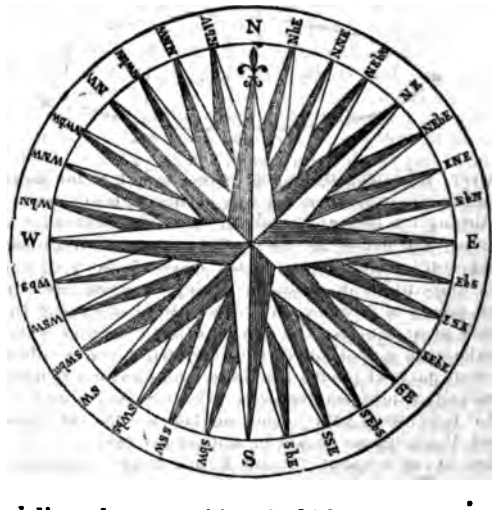
The subsequent account of the compass, is derived, in an abridged form, from TOMLINSON'S *Manual of Natural Philosophy;* to which work we likewise owe the figures illustrative of the subject.

The principle of the compass is, that a magnetic needle such as is here shown, is suspended, for land purposes, *over* the card on which the points of the compass are delineated.

The annexed cut shows the polarity of the needle, which is balanced on a point C, at the top of the stand BA. The point C of the magnet, is the *neutral* line, and is equidistant from the poles N and S.



The accompanying figure represents the card of the compass, and shows the visible horizon of any place. It is circular, and divided into thirty-two parts by lines called

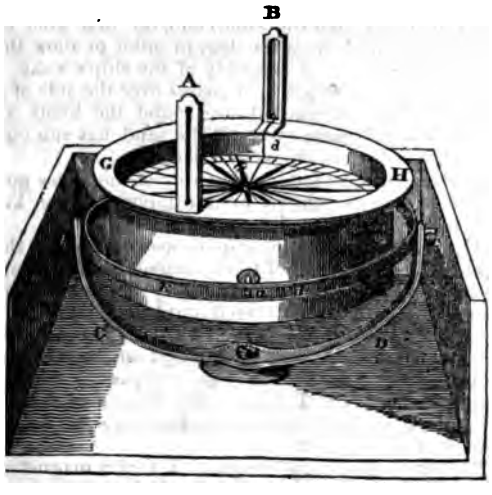


rhumb-lines, the extremities of which are *points*. As the whole circumference contains 360°, each point is 11¼°. The principal points are four; called *cardinal* points; as being

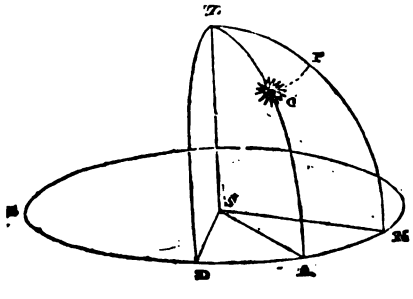
* A fathom is six feet.

on which the others *hinge* or depend. The North
al point has a fleur-de-lis. A needle suspended at the
of the card, and enclosed in a box, is used in sur-
.

the magnetic needle of a ship's compass, is placed
the card, along the North and South line; so that the
beys all the motions of the needle. The annexed
ntation will serve to illustrate the two sorts of com-
used on board ship,—the Steering and Azimuth com-
The steering-compass is without the sights A and B.



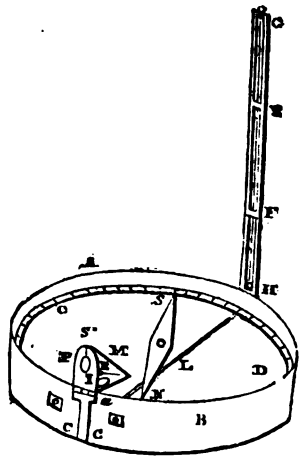
figure, the nearest side of the square box is repre-
as wanting, in order to show the interior arrange-
The steering-compass is often called the *Binnacle-*
s; because it is contained on board in a large wooden
rnished with lights at night, and an hour-glass; and
iced in front of the helmsman at the wheel. This
called the *binnacle*, and has no iron work in or about
is compass, with its gimbals, is usually fitted into
nacle, without the box. The steersman, in guiding
ip, is careful to keep the point of the horizon as
l upon the card coincident with the black line *d*,
ine is termed *Lubber's-point.*
n the sights A and B are placed on the sides of the
s-basin, this becomes an azimuth-compass. Azi-
the angular distance of a heavenly body from the
or South. Thus, in the annexed figure, if S be the



r, Z his zenith or point overhead, Z N his meridian,
is horizon, then Z A will be the azimuth circle pass-
ough a heavenly body C. D is the east point of the
. The arc of the horizon, N A, or C P above, measured
ees, is the azimuth of the heavenly body C, and A D
mplitude, or distance in degrees from the East or
oints of the horizon. The use of observing the am-
or azimuth of the sun, or other heavenly body, is to
in the *Variation of the compass*, which is different in
t parts of the world; there being but few places, com-
ely, where the needle points truly North and South;
is evident, that if this deviation were not constantly
the compass would be almost useless.
us now recur to the figure of the compass going
The sights are placed vertically on the rim G H of
in. The sight A, which the observer looks through,
ce of brass with a narrow slit. The other sight B, is
d towards the object; down which slit passes a fine
horse-hair. There is a vertical line going down from
h marks the degree on the rim of the card, when
the card is stopped in an observation by a small lever connected with it. This compass is held in a square box. The compass-basin is supported by a semicircle of brass C D, passing below the basin, and screwed firmly to the bottom of the box: and it is suspended horizontally by two opposite pivots, one of which is seen at *a*, passing from its sides into a hoop of brass E F, which hoop, by means of pivots from two extreme points *b c*, is connected with, and rests from the extremities of the semicircle C D. These hoops are termed *gimbals*, and their use is to keep the compass horizontal, however the ship may be tossed about in the sea. The compass-basin is covered with a glass to prevent the card from being agitated by the air.

When, in looking through the sight A, the sun, or a star, is seen to be bisected by the wire at B, the card is stopped by a handle at the side of the basin, and its angular distance from the North or South, or from the East or West, as shown by the card, is taken; the former angle being termed the magnetic azimuth,—the latter, the magnetic amplitude. From these are computed the true azimuth and amplitude; and thence, the amount of the variation of the compass.

An azimuth-compass of an elegant, cheaper, and more portable character than the foregoing, has been contrived by the late Captain Kater. We here give a representation of it. A B is a cylindrical brass box, one inch deep, with a



glass cover. This box contains the compass-card C D, which is five inches in diameter, and the needle N S, delicately poised on an agate cap. The needle is attached to a disk of talc, round the rim of which is laid a ring of card, graduated to half-degrees. A slanting piece of ivory is seen within the box, just projecting over the margin of the graduated circumference of the card; and an index-line is marked on the ivory for reading off the divisions on the card. A brass sight-frame G H is placed exactly at the opposite side of the box; it is five inches in length. A shorter frame E F, two inches long, slides up and down G H; and contains the segment of a glass cylinder. When the sun shines upon this lens at E F, its rays are collected into a linear focus; and the line of light, being cast upon the index-line of the ivory projection, may be seen at the same time with the degrees on the card. The frame G H can be bent down by a hinge at H, when the instrument is not in use. It then presses upon a lever L which raises up the needle N S, and prevents it from getting damaged. The sight for the observer's eye is one inch in height from the hinge *a* to its upper part; but it may be raised higher by means of an upright piece which slides between two grooves in the side of the box, as shown at *c c*. This upright piece has a vertical slit s', which terminates in a hole I, with a convex lens. There is also a horizontal plane below E, fixed beneath the hole I; in which plane there is also a convex lens, attached to which at an angle of 45° is a mirror, E, on the inner side of M, by means of which, and the lenses, the observer looking through the hole at I, sees the degrees on the card by reflection, reversed and magnified. The figures expressing the degrees, are therefore printed in reverse, so as to be read in their proper position, when seen through the lenses.

In making an observation with this instrument, the frame G H is raised and directed towards the luminary. Then the cylindrical lens E F, is slid up or down, till the linear focus of the sun's light falls upon the ivory index. This is viewed through F; and when the card is steady, the degrees and parts shown by the index-line below I, which is bisected by

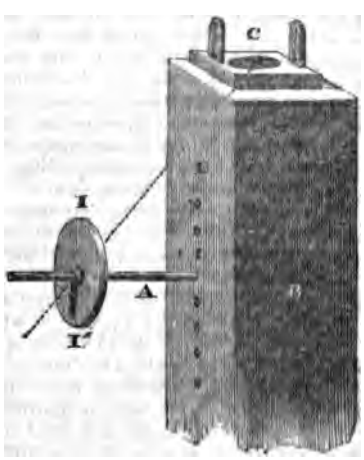
the solar line of light cast by the lens E F, are read off, which will give the magnetic azimuth. When an observation is made for the azimuth, the heavenly body observed should not be much above the horizon; and if it be the sun, the observation is made most safely, when the sun's disk is bisected by the horizon.

This compass may be used in surveying. For this purpose, the lens E F, is moved out of the way to the top of the frame G H; and then the horse-hair, or wire, passing down G H, is distinctly seen. The hair or wire, being viewed through the slit s', is made to bisect an object seen by direct vision, at the moment when its bearing by the card is viewed by reflection. This hair, or wire, is not used in observations of the sun; but must be applied, when the amplitude or azimuth of a star is taken; and the lens on G H is not used in terrestrial observations. The sight at F may be thrown back by means of the hinge at *a*, and the degrees read off with the naked eye.

But the compass,—the providential and excellent aid of the mariner, was discovered, in progress of time to err, even from the *magnetic* meridian. With how much less certainty then could the mariner know the geographical meridian, when out upon the boundless ocean! We refer to the local attraction of the compass-needle in consequence of the masses of iron on board-ship; whereby the needle is drawn more or less from the magnetic meridian, according to the situation of the disturbing causes with respect to the needle. This effect is called *the aberration of the needle*; and is of large amount in ships of war; where the guns, shots, water-tanks, and frame-work of the vessel, are all made of iron. But the real cause of this evil was not suspected until the year 1794, when it was first cleared up by Mr. Downie, master of his Majesty's ship Glory; and Professor Barlow instituted the means for remedying the evil; which means, we will endeavour briefly to give an idea of.

Among many useful and curious facts, which Barlow elicited in the course of his experiments, he ascertained, that the magnetic power resides entirely on the surface of a body and is independent of it as a mere mass; so that a hollow shell of iron, of two or three pounds weight, would have as much attractive force, as a solid ball of the same diameter, weighing 50 or 100 lbs. Hence, as the disturbing causes of the magnet are a-head of the compass, Barlow thought of arranging a certain amount of metal behind the compass, which should compensate, or nullify, the effect of the ship's metal, by making suitable allowance for it.

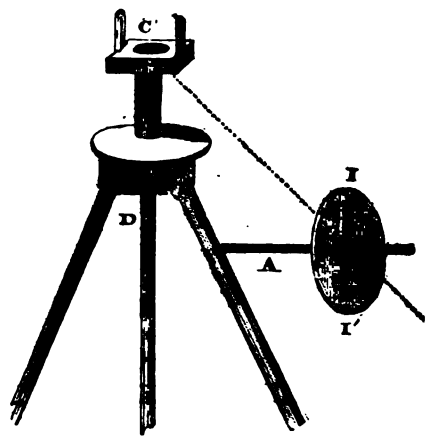
Fig. 1.



Mr. Barlow's Correcting Plate, or Magnetic Compensator is shown in the annexed figures 1 and 2; where in both cases A is a rod of brass or copper, 1½ inch in diameter, and I I' two thin circular plates of iron, 12 or 13 inches in breadth. These plates are not in contact; but are separated by a circular piece of board or card, and pressed together by means of a brass nut at their centre, on the end of the rod. Other small screws are used near the rims of the plates, in order to make their union more even and complete. Two plates are used, in order that any defect or irregularity in one may be corrected by the other; that a tendency to warp may be obviated; that a larger extent of surface may be gained in a smaller space; and lastly it is found that the plates are more powerful when separated than when in contact.

In fig. 1, B is a box moveable on an axis, in ord may be turned round in any direction, as the he ship is turned round at sea. This box is used on has no iron connected with it. On the side E ar holes for the reception and adjustment of the ro azimuth-compass C, is fixed on the top. The app fig. 2, is used on board-ship, to support the same compass C'; which sort of compass is chiefly em these observations, not only as being more portal enabling the observers to measure arcs of the horiz and the binnacle-compass must, however, agree observations.

Fig. 2.



The manner of using this apparatus is as follow a ship, being about to proceed on a voyage, has all its metal on board, the variation of the com carefully noted as the ship's head is swung rou principal (say, the four cardinal and four s points of the horizon. The box B, with this compa top, is then taken on shore, and set down where free from all metallic attraction. The object of the on shore is, by the adjustment of the plate I I', on of the box E, as this box is turned round to the points of the horizon, (those mentioned before), t the same, or similar, irregularities in the needl compass C, on the box B, as were occasioned to th of this compass when on board, by the masses o the ship. A little practice will soon enable any adjust the plate, as to obtain the object in view with accuracy. This having been effected, the distance centre of the plate to the pivot on which the need is carefully noted; together with the angle which makes with a vertical plane. Whenever the plate on board, it must be fixed to one of the legs of the (which usually supports the azimuth-compass d observation,) at the same distance from the centr needle at C', and at the same angle with the ve when inserted in the side E, of the box B.

Now, as the plate was made to produce as much all the iron on board, when the plate is used on bo error is consequently *doubled*. It is, of course, un that, whenever the azimuth-compass is used, it placed in the position where it was just before tal box B on shore; as the needle is variously affecte ferent parts of the vessel.

The action of the metal on board is to *increase minish* the true variation, according as the ship lie time; and, as the plate doubles the error of the v allowance is made, + or —, accordingly.

In process of time it came to be observed that of going of the chronometers on board ship was less affected by the quantity of metal on board, by partial masses near the chronometers: owing t the difficulty of truly determining the longitude time-keepers was made more decided. The e spoken of, was at first imputed to the motion of th on the seas, until, in the year 1818, Mr. G. Fish accompanied Captain Buchan in his voyage to t seas, observed that the chronometers went differ shore from what they did when they were in the ve subject to the metallic influence on board. This b the subject likewise engaged Barlow's attention;

remedy suggested by him is dependent on the same principles as those applied in the former case.

Charts of different places on the earth's surface are necessary for the mariner. A chart is a *nautical map*, containing, besides general geography, a detailed account of the coasts and shores, rocks, sand-banks, &c., &c. A globe is the most natural representation of the earth; but this is usually of necessity small, and cannot give places in detail, so well as maps. But as much of the convex surface of the earth cannot be laid down on a plane surface, and as the *bearing* of a place is of more importance to the navigator than its apparent size, charts are drawn with the meridians parallel to each other, so that the northern and southern parts of such a map are swelled out and distorted beyond nature; but the bearing of places thus laid down is accurately estimated at a glance. Hence, as far as appearance goes, the nearer a place is to the equator, the truer is its apparent comparative size in nature; and the nearer we get to the poles, the more magnified is the representation.

III. By the log and the compass, the latitude and longitude of the ship may be inferred by calculation; the latitude and longitude at departure being known. The ship's progress is set down for twenty-four hours on the log-board or slate, and is transferred to the log-book, and at twelve o'clock every day the account is made up. The distance run by the log, in the direction as shown by the compass, gives the difference of latitude and longitude *by account*, which is called the *dead reckoning*: but as this method is apt to be fallacious, except in short cuts, astronomical science furnishes means for correcting the latitude and longitude by account *by observation*. The instrument used for this purpose is the quadrant, or sextant, or both.

The use of this instrument was adverted to in a former article on Navigation, No. 417, p. 252, of this work. The modern quadrant is an improvement upon the ancient astrolabe; and the sextant is an improvement upon the quadrant. Moreover the reflecting circle is an improvement upon the sextant.

The quadrant is more properly termed an *octant*, because its arc embraces the *eighth* part of a circle, though we are thereby enabled to measure a quadrantal arc, or the fourth of a circle, = 90°. The *sextant*, however, has an arc to the extent of one *sixth* of a circle; but we are enabled by its means to measure an arc of 120°, or the third part of a circle. The reflecting circle, a still more accurate instrument than the foregoing, has an entire circle graduated, and enables us to measure larger arcs, than we could do with the before-mentioned instruments.

The principle of these three comparatively modern instruments being the same, we proceed to illustrate their nature and use, by reference to the accompanying figure of the Quadrant.

A is the frame-work of the quadrant, and affords convenience for grasping it during observations on board. B is the index, which turns on the centre of the circle, of which the divided limb D is a part or arc. The index B carries the index-glass I perpendicular to the plane of the index, and in a line with O on the vernier scale C. G is the fore horizon-glass half silvered, and so placed by means of its adjustment as to be parallel to the index-glass, when O on the vernier is at O on the limb D. K is a sight hole, through which the horizon is seen through the unsilvered part of the glass at G. At H is a set of coloured glasses, by using one or more of which we may protect the eye from the direct rays of the sun. E F is the back horizon glass and sight. This glass is silvered at both ends, and in the middle there is a transparent slit, through which the horizon may be seen. At L is a nick to prevent the index from slipping off from the frame.

Now the sextant is an instrument rather more finished and nice in its construction than the foregoing: being more delicately graduated, and having telescopes for more perfect and distinct vision. The limb D of the quadrant is divided into 90 equal parts or degrees, which degrees are subdivided by means of the vernier C into minutes, 60 of which = 1 degree. But we more usually find that each of the degrees on the arc D is divided into thirds, each = 20′; each of which thirds is subdivided by the vernier into twentieths, or single minutes.

We cannot here conveniently enter into a consideration of the optical principle by which the arc D, though only the eighth part of a circle, affords us an estimate of angles to the extent of 90°. We proceed, therefore, to show the *use* of this instrument.

When "a sight," as it is commonly termed, is taken, or when an observation is to be made,—of the sun, for instance,—the index B is moved along till the lower limb of the sun is seen through the sight-hole K in the silvered part of the horizon-glass G, and in the same line with the natural horizon seen through the unsilvered part. Then the portion of the limb, over which the index has been moved, is the measure of the angle. This method of observing the altitude of a celestial body is termed the *fore observation*. The other method is when the observer's back is towards the object, and it is brought over to the opposite part of the horizon; the observer then looks through K; and this mode of observing is termed a *back observation*. This latter method of observing is, however, very seldom used; and is requisite only when the horizon under the object is broken by adjacent shores, or rendered indistinct by fogs, or any other impediments.

The principal use of the quadrant is then to make observations on board ship,—to find the altitude of the sun or of a star; that is, the angle which the elevation of such heavenly body makes with a horizontal line, or the boundary line of the sea, as seen in the distance. This angle can never be more than 90°, or the distance from the zenith to the horizon; and the altitude of the sun reaches this extent only at mid-day, and in certain latitudes. The quadrant, therefore, whether with relation to the sun or a star, is always sufficient for taking the latitude; but, as a larger arc is often necessary to be measured in finding the longitude by lunar distances, we then have recourse to the sextant.

The sun coming upon the meridian, marks the close of one nautical day, and the beginning of another. At this time the reckonings for the past twenty four hours are made, which is termed *doing a day's work*. By an easy problem in nautical astronomy, the altitude of the sun at twelve o'clock, or its meridian altitude, enables the sailor to obtain the latitude of the place. But the latitude may also at other hours be taken by observation of the Polar star; but the meridian altitude of the sun has most advantages. There are about a dozen methods of finding the longitude, more or less easy on land: but none of them are available on ship-board, but two,—by *chronometers* and *lunar distances;* because no instrument can be conveniently used for observation of the heavenly bodies, but the quadrant and sextant; whose use is not impeded by the rocking of the vessel.

If an accurate chronometer, set to Greenwich time, be taken from London by a ship proceeding on its voyage, the difference of time, ascertained by the sun's coming upon the meridian at the time of taking the latitude, between the chronometer and the ship's time, gives the difference of longitude. If the difference of time be one hour, the difference of longitude is 15°—E., if the ship's time be *beyond* the chronometer, and W. if it be *behind* the chronometer. In practice, it is a matter of indifference whether the chronometer carried about on board-ship from place to place, really shows Greenwich time; so that its daily rate of going, and consequently, its accumulated error, be known at any stated moment. All that is required of the chronometer, therefore, is, that it should afford the means, (with or without correction,) of discovering the true time at Greenwich, at any particular moment.

The term *lunar distances* implies the distance of the Moon from the Sun, or from any of the fixed stars, which are in the neighbourhood of her path. As the moon is constantly changing her place, these distances are constantly varying. The distances at certain hours of every day in the year are given in the Nautical Almanac, which mariners take on board with them; and when these distances by measurement with the sextant are found to occur at different times from what the Almanac gives for their occurrence at Greenwich, the observed difference of time furnishes the difference of longitude, as specified before. This method of proceeding to find the longitude is termed "taking a lunar."

The question of the longitude has always been important, from the difficulty of ascertaining it with tolerable correctness. In 1714 Parliament offered a reward of 20,000*l.* for the discovery of a method for finding it within half a degree. Soon after, Harrison made a chronometer for this purpose, which varied only two minutes in four months, and received the reward. The act was repealed in 1828. The board of Longitude, the Nautical Almanac office, and the Royal Observatory, are devoted to this important problem.

Many of the old seamen are still prejudiced in favour of

working the ship by the dead reckoning, and look upon the aid of astronomy and the chronometer with suspicion. It is related that, some years ago, during the war with France, an officer having for the first time brought a chronometer on board, the sailors regarded it as an omen of ill luck; and it so happened that, the vessel being out cruising for prizes, nothing fell in their way for a long time, which unfortunate circumstance was referred to the luckless chronometer. Some desperadoes on board determined, in consequence, to pilfer the chronometer and consign it to the bottom of the sea, which they did; and, falling in with some prizes shortly after, which they took, they congratulated themselves on their escape from all malign influences.

The experienced mariner is also versed in many other things, which our limits will not allow us to dwell upon; such as the state of the sea in different parts of the world, the nature of tides and winds, the coasts, floatings of weeds, flights of birds, the state of the barometer, &c.

It is related, for instance, that the captain of a vessel, sitting in his cabin one day, while his ship was gliding along the Indian sea under full sail, observed the mercury of his barometer to sink rapidly and almost at once. Knowing that a partial vacuum in the atmosphere preceded a dreadful storm in the tropical climates, he immediately ordered all the sails to be furled. The order was obeyed with astonishment, as nothing seemed likely to interrupt the serenity of the skies; but, scarcely was the task completed, ere the most awful storm fell upon them that ever ship encountered; and they had only consulted their safety in the nick of time by taking in their canvass. It is further stated that several ships in the neighbourhood met the sudden storm without having prepared themselves to withstand its fury, and were consequently wrecked.

We will conclude this paper with a pleasing anecdote, related by Captain Basil Hall, to show the necessity for midshipmen and officers being ready and expert at observing, not only the sun, but the stars likewise, for their latitude; and these too in almost all weathers: for it often happens that the latitude and time on board ship cannot be obtained by a meridian altitude of the sun, in consequence of clouds; but it seldom happens that the sun and stars are all obscured long together.

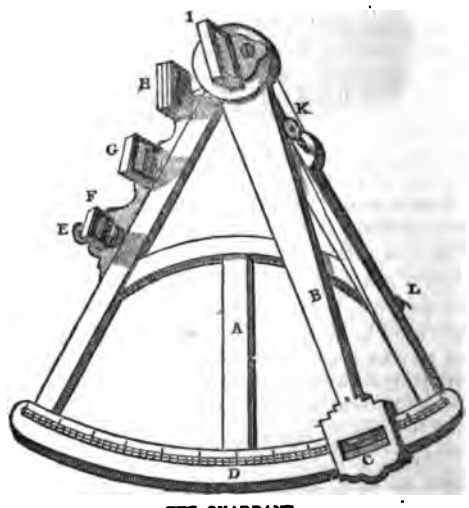
"We were running for the British Channel before a hard south-west gale, and it was of considerable importance that we should reach some port in England without delay, for we were not only charged with despatches, but were very short of provisions and water. The only chronometer I had on board happened not to be very good, and the sky had been completely overcast for more than a week before, that we could take no lunars. Thus I felt uncertain of my longitude, to the extent of a degree at least; and all who have tried the experiment, know what a nervous thing it is to run in for the land in the dark, and in stormy weather, when the ship's place is not correctly known. But I felt exceedingly loath to lose so magnificent a wind, before which we spun along at the rate of ten knots, under a reefed foresail and close-reefed maintopsail. As long as daylight lasted, I felt very confident and bold about the matter; but as night closed in, the doubts and difficulties of the Channel navigation crowded round my thoughts, and almost determined me to bring the ship to, and wait for the dawn. After poring for a long while over the chart, however, I satisfied myself that if, by any means, I could be sure of keeping in the latitude of 50½°, or within ten or a dozen miles on either side of that parallel, I should have clear ground to run over for three degrees of longitude at least, greatly within which, I felt sure that the error of my chronometer must lie. But how was I to determine this point with any degree of certainty in such weather? The sky had not showed a patch of blue as large as my hand for several days, and though the sun had been seen through the clouds occasionally, we had not succeeded in catching a meridian observation.

"In this dilemma, I bethought me of the pole star, proverbially the mariner's friend, and having fixed my sextant by the cabin light at the angle about which I knew the latitude must give the altitude of the pole, I cast my boat-cloak over my shoulder and went on deck. There I stationed myself on the larboard side of the quarter-deck, with the instrument sheltered from the rain and spray under the cloak, and grasped in my right hand, while I kept my eye fixed on that part of the heavens in which I hoped, at some momentary opening, to detect the bright star of my night's fortunes. I had to wait more than an hour before there occurred anything like a chance; by which time my limbs had become cramped and stiffened by the constraint of one posture, while my eye ached and throbbed with its vain attempts to pierce the thick courses of clouds sweeping past.

"At last I did get sight of the star for three or four seconds, and though it glimmered so faintly through the mist that it could hardly have been identified as Polaris even by Sir James South himself, I knew, by its altitude, that it must be the object I was watching for. The horizon was but a shabby one, indistinctly seen in the dark, and hacked by the topping waves like the Sierra Morena. Nevertheless I succeeded in bringing the star in contact with the edge of the sea in the north, where, fortunately, there chanced at that moment to occur a faint gleam in the lower atmosphere. I ran below, read off the angle, computed the latitude, and found it not more than twenty miles from what I had expected, and quite enough to keep the ship safe for some hours' run. But as one insulated observation, made under such circumstances, could not be depended upon, I hastened on deck again, and presently—that is in less than half an hour—caught a second glimpse of my friendly lighthouse in the sky. The result agreed with that of the first observation within ten miles, and of course gave me greater confidence.

"Still as the night was dark, the horizon bad, and the observations both to the north, I could not rely upon them to the extent which was desirable, I may say indispensable, in running for the Channel in such a night, and at such a rate. So I cast about to fish for a star on the southern side of the zenith, and was rejoiced to find that a brilliant planet, either Jupiter or Saturn, I forget which, came to the meridian before midnight. On deck I went again, sextant in hand, and although I possessed no very certain means of telling 'the time at ship,' I watched for the planet, and caught it for a moment, not very far from the meridian, as I knew by the 'compass bearing.' With a flushed cheek, and hand trembling so that I could hardly hold the pencil, I worked out the latitude, and found it to differ from the mean of the two results by the pole-star rather less than twenty miles. A second cast at the planet, after it had passed the meridian a few minutes, gave, when properly reduced, a latitude which differed only five or six miles from the first. Putting all these observations together, I felt quite certain that the ship's path lay within the limits marked along the chart as a safe track, and, having given orders to shake out a reef, pressed forward as fast as masts, yards, and hull would bear.

"The ever-welcome dawn at length appeared, and not long afterwards I had the infinite satisfaction of discovering from the deck the well-known Lizard Point, with its two lighthouses, streaming with the night's rain, one above the other, and shining brightly in the morning sun."



THE QUADRANT.

In our next paper we shall conclude the subject of NAVIGATION, with an account of the origin, rise, and progress of Steam Navigation.

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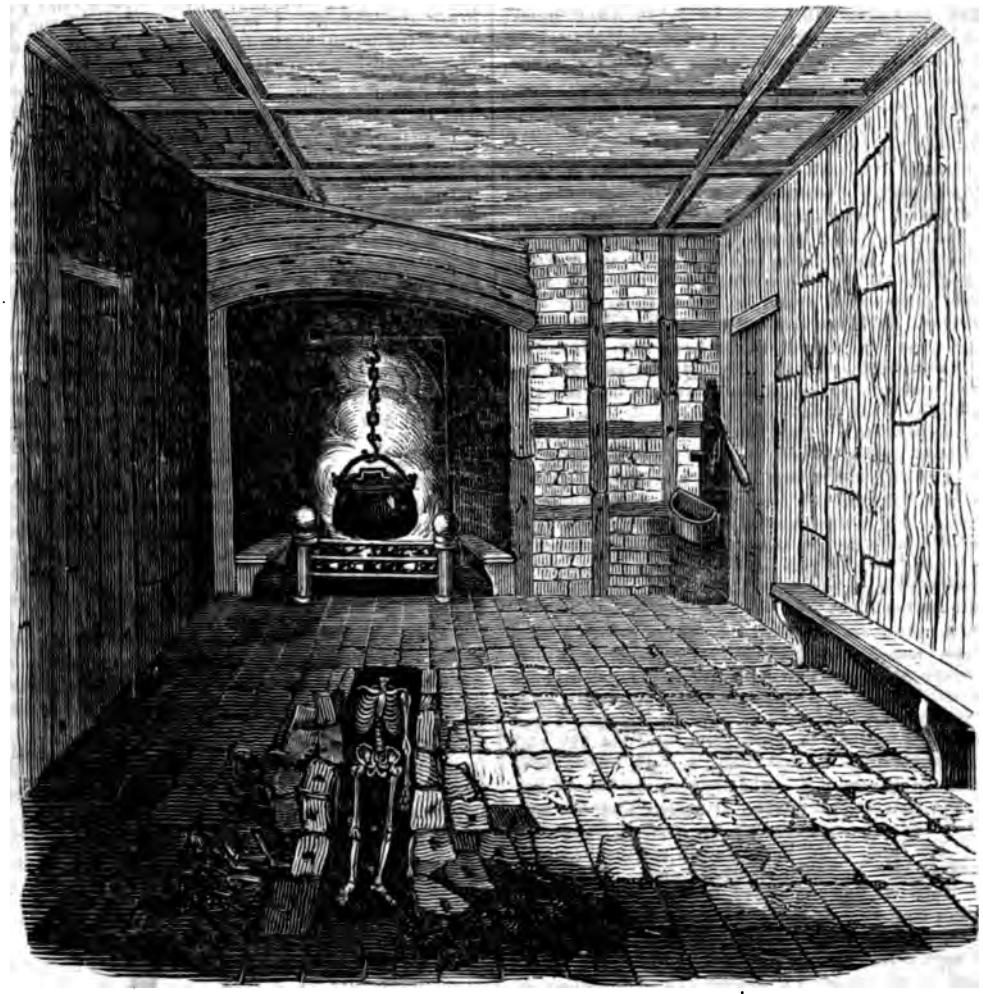
THE DUKE OF BUCKINGHAM.



SKELETON OF THE DUKE OF BUCKINGHAM, DISCOVERED AT SALISBURY.

rontispiece, which is presented above to our s, gives a view of the kitchen of an inn in ury, in which, while some repairs and alterations eing made, a skeleton, in the condition shown : picture, was discovered beneath the floor of artment, which is on a level with the ground. v of the appearance of the figure, together with artment, was made, and published in Salisbury '. J. M. Cullam,—of which view, with his per- n, we have taken a copy. These human re- are, with good reason, supposed to have ged to that Duke of Buckingham, who was a guished figure in the troublous times of Richard iird. We will, therefore, give a short historical nt of this unfortunate nobleman.

: Duke of Gloucester, being an ambitious and ing man, felt a great longing to arrive at the ign power; and giving way to these feelings of ion, he scrupled not to perpetrate any acts would lead to the consummation of his wishes. uke of Clarence, an elder brother, was taken

off by violence during the life-time of the oldest of these brothers, Edward the Fourth. King Henry the Sixth and his son had died violent deaths, mainly through the instrumentality, as it is believed, of the Duke of Gloucester. King Edward the Fourth dying, left two sons, Edward the Fifth, and a younger brother, the Duke of York. The former being only thirteen years old at his accession to the throne, the kingdom was placed under the protectorship of the Duke of Gloucester, until the young king should arrive of age. As wickedness usually proceeds by degrees, the young princes were at first *set aside*, with a view to Richard's being, as it were, elected to the throne. The Duke of Gloucester sought to make friends wherever he could; and among others, he succeeded in engaging the advice and assistance of the Duke of Buckingham, a popular nobleman of the time, and the subject of this memoir. Those whom he could not detach from the interest of the young but rightful monarch, and whose names and influence were potent, he caused to be put to death

for specious and alleged crimes. The Duke of Buckingham having undertaken the cause of Richard, with the hope and promise made him of great rewards and favour from the monarch to be raised to the throne by his influence, used a variety of arguments, hollow and deceitful, though adapted to catch the fancy of the populace, with the view to make the question of setting aside Edward, not merely proper and desirable, but just and necessary. We are told that he used every art to cajole the citizens and other influential people of London to espouse openly the cause of the Protector, but that they neither saw the justice of Richard's pretensions, nor could they venture to express their dissent. The duke, therefore, forced himself to construe their silence into consent; and his followers, who had mixed themselves among the crowd, threw up their caps and shouted out "Long live King Richard!" This was sufficient warrant for the mayor and aldermen, at the instigation of Buckingham, to wait upon the protector and implore his acceptance of the crown. This desire, we are further told, was yielded to, with seeming reluctance.

Richard's earliest care, when he had attained the kingly power, was to cause the young princes to be privately put to death. Whether in relation to this foul and nefarious deed, or that the king did not fulfil the promises to Buckingham which he had made to engage his assistance, or whether the duke was vexed at both these circumstances,—coolness and distrust rose up between the sovereign and Buckingham, which proceeded so far, that the latter, in dread of the former, fled to his feudal domains in Wales, where he assembled his followers, and endeavoured to excite an insurrection against Richard. With the body of men whom he had levied, he passed through the forest of Dean, and advanced by hasty marches towards Gloucester, where he designed to cross the Severn. Just at that time, however, the river was swollen to such a degree, that the country on both sides was deluged, and even the tops of some hills were covered with water. This inundation continued for ten days, during which time Buckingham's army could neither pass the river, nor find subsistence on their own side: they were therefore obliged to disperse and return home, notwithstanding all the duke's efforts to prolong their stay. This flood was for a long time after called "Buckingham's flood." The king was at this time proceeding towards Salisbury with a large army, intending to come round upon Buckingham from the south, and was about two days' journey from that city when he heard of Buckingham's disasters. A proclamation was immediately issued, which offered a reward of 1000*l.* to any person who should give such information as would lead to the apprehension of the duke. In the helpless situation, in which the duke was after the secession of his followers, he resolved, upon deliberation, to take refuge at the house of a person named Humphrey Bannister, who lived near Shrewsbury, and who had once been his servant, and had received repeated obligations from the family: but this person, being unable to resist the temptation of the reward set upon the duke's head, went and betrayed him to John Milton, the sheriff of Shropshire, who apprehended the duke, while digging in a grove near Bannister's house, disguised as a poor countryman. He was instantly conveyed to Shrewsbury and examined, whence, under a strong guard, he was conveyed to Richard, who had by this time reached Salisbury. It is said that Buckingham earnestly desired to be admitted to the presence of the king, and that he purposed to stab him with a knife, which he had secreted about his person, while in the act of kneeling before him. But he had no sooner arrived at Salisbury than, without seeing the king, he was condemned and executed in a summary way, without form of trial, on a new scaffold, erected in the market-place of Salisbury.

Tradition assigns the court-yard of the Blue Boar inn as the scene of this bloody tragedy; but great uncertainty seems always to have prevailed as to the spot where the mutilated remains of this unfortunate nobleman were finally deposited. It is supposed that the head and right arm, after having been submitted to the personal inspection of the king, then resident at "the king's house" in the Close, were sent to London to be affixed to Temple Bar, or exposed on Tower Hill, as was commonly used to be done in those times. A tomb in the north chantry of St. Thomas's Church, Salisbury, was once supposed to contain the remains of Buckingham; and another in Britford Church, near Salisbury, obtained a similar reputation: but sufficient evidence has been found to show that these were only *monuments* to his memory; and no indications, leading to probability, however, have ever appeared, to point out the place of sepulture of the Duke of Buckingham, till the discovery took place, which is represented in our frontispiece.

The Saracen's head inn, (owing to the peculiar contiguity of the two places,) is supposed to have once formed part of the premises attached to those of the Blue Boar. The grave, therefore, of the duke was probably made only a few yards, possibly feet, from the spot where he suffered decapitation. The skeleton was found about eight inches below the surface of the soil. The spinal column appeared embedded in the clay, and, on taking up some of the detached vertebræ, they crumbled to dust in the hands. All the remains were in a like friable condition. In fact, the condition of these remnants of mortality forcibly reminds us of the pulverable and loosely adhering state, in which the remains of King Charles the First were found, in the year 1813. Till that time, it had never been known where the body of this unfortunate king was deposited; and the coffin, containing his remains, was only discovered by some workmen at Windsor Castle, while engaged in making repairs. By permission of the Prince Regent, and in his presence, Sir Henry Halford opened the coffin, and examined the body; which, as far as it was examined, not only dispelled all doubt as to the identity of it with Charles the First, but appeared in the same friable condition as the bones found in the clay beneath the floor of the Saracen's head inn at Salisbury.

The memorials of antiquity furnish a useful lesson to the contemplative mind, whether they come down to us in pomp and grandeur, or in sadness and humility. They teach us that we ourselves shall, in like manner, pass away; and that either in ourselves, or in our works, we shall serve as memorials for those who are to follow. The Duke of Buckingham was both the tool and the victim of his sovereign; and, as both proceeded in wickedness, so the end of both was in disgrace and sorrow. It behoves us, therefore, to profit by their example, and to learn that safety no longer exists for us, when we have once started aside from the straight path of rectitude.

IF we would but deny ourselves sometimes in unnecessary desires, even when it is in our hands to humour ourselves, and gratify our desires, it would be of excellent use: for we must remember, that as long as the things of this world are empty and finite, our trouble will not end by satisfying, but by ceasing our desires.—BISHOP PATRICK.

FANATICAL MURDERERS IN INDIA.

The number of the Edinburgh Review for January, 1837, contains an article which will excite not a little astonishment—an account of the exertions of the British Government in India to put down the most formidable combination of murderers of which there is any instance in the history of the world. From the overwhelming evidence, it appears that there has flourished alike under Hindu, Mahommedan, and British rulers, a vast fraternity of *murderers*, consisting of many thousands of persons, which has spread its ramifications over the whole of India, from Cape Comorin to the Himalayas; and yet, though it has every year destroyed multitudes of victims, its constitution, nay its very being, have been quite unknown to the most active and vigilant English functionaries, and very imperfectly understood even by the native governments. The book from which the article is drawn up is a collection of official papers, printed by the Indian Government, for the information of its officers, but never published; and the writer of the Edinburgh Review has conferred no small favour on the public by digesting into one connected statement the many interesting facts disclosed in a work inaccessible to common readers, and which, even if accessible, might, from want of arrangement, be in a great measure unintelligible to them.

These extraordinary persons are called Thugs, and their profession is called Thuggee. They travel along the roads under various assumed characters, in parties varying from ten or twelve, to several hundreds, appearing as traders, as pilgrims, as Sepoys seeking or returning from service; and sometimes one of their number figures as a raja, with all the necessary equipments of tents, carriages, &c., and the rest act the part of his obsequious followers. If the gang be numerous, they divide into parties, following each other at some distance, or take different routes, assembling at an appointed place. They insinuate themselves into the confidence of travellers, with whom they usually propose to join company, for mutual safety; proper places are selected for the murder, and precautions taken against intrusion:—

The travellers are generally induced to sit down, under pretence of resting themselves, and they are strangled at once, at a given signal. The bodies are then burned, after having been mangled to expedite dissolution, and to prevent their swelling, and causing cracks in the ground. Two Thugs are employed in the murder of each individual, one of whom holds his legs or hands, while the other applies the noose. If a traveller have a dog, it is also killed, lest the faithful animal should cause the discovery of the body of its murdered master.

The disclosures which were made on the apprehension of a large gang of Thugs by Major Borthwick in Malwa, in 1831, attracted Lord William Bentinck's attention to the subject, and a system was organized by him, for the general suppression of the monstrous evil. Jubbulpoor was fixed on as the centre of operations; Captain Sleeman was appointed superintendent, with a number of European assistants, and the co-operation of the native states was engaged. Up to October, 1835, there had been committed 1562 persons, of whom 382 had been hanged, and 986 transported or imprisoned for life. It is only through the British supremacy in India that the Thugs can be suppressed, for, strange as it may seem, they are most religious and *respectable* persons. The fraternity has, indeed, a religious foundation, and the miscreants believe that in robbing and murdering, agreeably to their rules, they are rendering an acceptable service to the Deity. To the Thugs, murder is an act of religion, just as much as the practice of charity is to a christian; and indeed when the omens are favourable, to refuse to murder would be to disobey the will of the Deity.

Murderers in Europe have the consciousness of guilt, and the bond of union between guilty men is loose; but these Hindoo murderers consider themselves as virtuous and good men. One of the witnesses says, "The father (a noted Thug) used to drink very hard, and in his fits of intoxication he used to neglect his *prayers* and his *days of fast*. All days were the same to him. This lad, Shumsheera, (also a Thug,) was always sober and *religiously disposed*, and separated from his father, living always with his uncle Dondee, (another Thug,) who was *a very worthy and good man*." Captain Sleeman says of them, that "no men observe more strictly in domestic life all that is enjoined by their priests, or demanded by their respective castes; nor do any men cultivate with more care the esteem of their neighbours, or court with more assiduity the good will of all constituted local authorities. In short, to men who do not know them, the principal members of these associations will always appear to be among the most amiable, most respectable, and most intelligent members of the lower, and sometimes the middle and higher, classes of native society; and it is by no means to be inferred that every man who attempts to screen them from justice knows them to be monsters." In short, soldiers fighting in their country's cause could not be less conscious of doing wrong; they are satisfied that they are performing nothing more than their duty in putting their fellow creatures to death.

In England, *respectability* is often at variance with religion. Ikey Solomons, had he not been prematurely disposed of, would have been, like other successful and rich men, *respectable*; but no one would have thought him religious. The Thugs, however, not only rob and murder, but are *religious* as well as respectable. That religion, which encourages wholesale murder and robbery, is a great calamity to the country where it prevails, and the only question with respect to the suppression of it must be one of power and prudence.

CANADIAN WINTER SONG.

BY MRS. MOODIE.

'Tis merry to hear at evening time,
By the blazing hearth, the sleigh-bells' chime*,
And to know each bound of the steed brings nigher
The friend for whom we have heaped the fire.
Light leap our hearts, while the listening hound
Springs forth to hail him with bark and bound.

'Tis he! and blithely the gay bells sound,
As his sleigh glides over the frozen ground.
Hark! he has passed the dark pine wood,
And skims like a bird o'er the ice-bound flood.
Now he catches the gleam from the cabin door,
Which tells that his toilsome journey's o'er.

Our cabin is small, and coarse our cheer,
But love has spread the banquet here;
And childhood springs to be caressed
By our well-beloved and welcome guest.
With a smiling face his tale he tells,
While the urchins ring the merry sleigh-bells.

From the cedar swamp the gaunt wolves howl,
From the hollow oak loud whoops the owl,
Scared by the crash of the falling tree;
But these sounds bring terror no more to me.
No longer I listen with boding fear
The sleigh-bell's distant chime to hear.

* The horses in the sleighs or carrioles have small bells hung on the harness, the sound of which is cheering to the animal as well as to his master. In a frosty night, sound is rapidly and extensively conveyed to an anxious and listening ear, and the tinkle of the distant sleigh-bell may well be thought musical.

LOCKS AND KEYS.

THE invention of these useful articles is of very great antiquity, but the specimens which have been handed down to us, of course bear no comparison with the efforts of modern mechanism. Taking the vast utility of the lock into consideration, it is somewhat singular that the first attempt to construct one on really scientific principles, dates back no further than 1778. A note in Beloe's translation of Herodotus, says:—

Before the use of locks, it was the custom in more ancient times to secure things with knots; of these some were so difficult, that he alone who preserved the secret, was able to unravel them. The famous Gordian knot must be known to every one; this usage is often also alluded to by Homer.

> Then bending with full force, around he rolled
> A labyrinth of bands, in fold on fold,
> Closed with Circæan art.

According to Eustatius, keys were a more modern invention, for which the Lacedæmonians are to be thanked.

However this may be, several articles of Egyptian antiquities that have been recently found, bear a strong resemblance to a rude sort of key; fig. 1 and 2 are in the British Museum, and made of brass or bronze. A very ingenious description of lock is figured in Denon's celebrated work on Egypt, which is at present in great use in Turkey and other parts of the east. According to our author it has been in use for four thousand years, and he endeavours to prove this by reference to a sculpture in the temple of Karnak, which he supposes represents this lock. If this is the case, the Egyptians possessed an article more secure in principle than most of our common locks with wards.

Fig. 1.

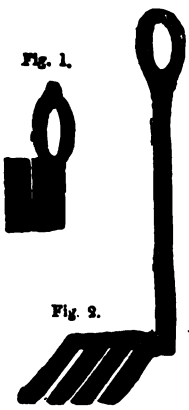


Fig. 2.

Figs. 3 and 4 represent its construction. Fig. 3 is a vertical section of the lock; A is the bolt, and B B the body of the lock; in the upper part of the body any number of loose pins, with heads, are placed in as many chambers, sufficiently large to allow them to be moved up and down freely, and yet steadily. The bolt A has an equal number of holes to receive these pins, reaching half way through its substance; we will suppose now the bolt to be sufficiently thrust out to have entered the staple, the lock is consequently locked, for the pins have entered the holes in the bolt, and prevent its being moved either backwards or forwards. Fig. 4 represents the key,

Fig. 3.

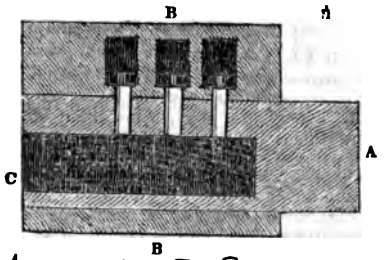
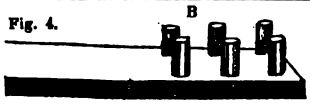


Fig. 4.



the upper part of which is furnished with a number of pins, exactly fitting the holes in the bolt; the lower half of the bolt is perforated with a square hole at C, sufficiently large to admit the key and its pins; when these are immediately under the loose pins which fasten the bolt, they can be caused to thrust them out of the holes they occupy, and allow the bolt to be withdrawn: the number of these pins in the above diagram is supposed to be six. To pick this lock it is evidently necessary to know the position of the pins in the interior, and the length of the holes in the bolt. To discover these facts would be a work of great labour, and consequently a lock on this construction would be extremely difficult to pick.

Figs. 5, 6, 7, and 8, represent ancient keys of Roman and British manufacture; fig. 9 appears to be the staple of an ancient lock.

Fig. 6.

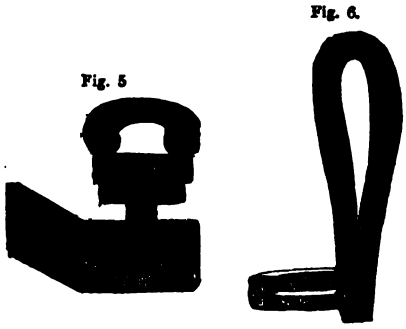


Fig. 5

Fig. 7.

Fig. 8.

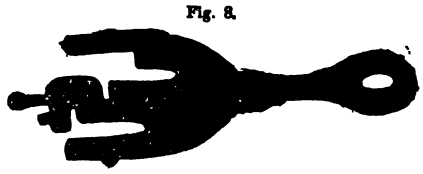
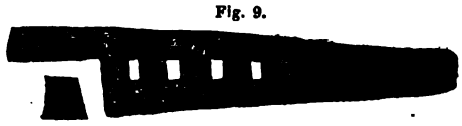


Fig. 9.



The locks of modern times, previous to 1778, were of two descriptions, namely, those furnished with fixed wards and a spring, and those with wards and a tumbler instead of the spring.

Fig. 10 is a common, or spring lock; in this case A B is the bolt passing through the frame of the lock; the spring is seen at A, and is a portion of the bolt itself; the key seen in the centre, when turned in either direction, if it is in contact with the lower part of the bolt, will move it, so as to lock or unlock it. The wards which are seen round it are circular strips of iron, some placed on one plate of the box and some on the other; the key is cut in such a manner as to pass these wards in the course of its revolution. It would seem that the number of the wards, and their form, would prevent a lock being opened by any but a key cut to receive them; but this is not necessary; for all that is required is to cut away so much of the key as will allow it to span the wards;—for instance, fig. 11 is a key cut in a very intricate manner, but all the complicated wards to which it is adapted, can be passed by a key shaped like fig. 12. The next engraving, fig. 13, shows the construction of a lock with a tumbler. In this case the bolt is moved by the key in the usual way, but immediately behind it a piece of iron is placed, called a tumbler, pressed downwards by means of a spring, and turning on a centre at A; the shape of the tumbler can be

Fig. 10.

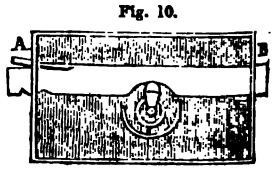


Fig. 11.

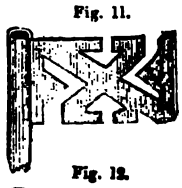
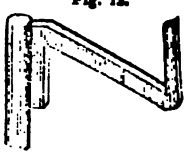
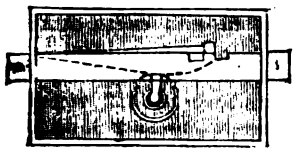


Fig. 12.



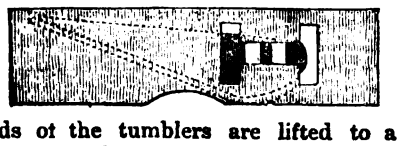
seen by the dotted line. At the extremity furthest from A is a square stud, which alternately drops into, and is lifted out of, one or the other of the two notches in the upper part of the bolt, so as to prevent it being forced back when locked, or thrown forward when unlocked, without the assistance of the key. In the engraving the bolt is half-shot. In this particular it has an advantage over the spring-lock, the lock of which can be forced backwards or forwards without the assistance of a key, but this lock also can be easily picked.

Fig. 13.



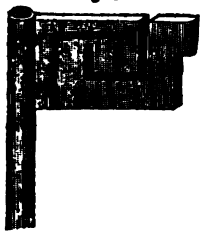
In 1778 Mr. Barron invented a lock, still much in use, greatly superior to those manufactured at that time; he employed two or more tumblers, each of which was provided with a stud. The engraving, fig. 14, represents the bolt of the lock; it is cut out in such a manner as to be moved by the key, when

Fig. 14.



the studs of the tumblers are lifted to a certain height; but as the tumblers are made of different widths, the bit, or end of the key, must project more or less in different parts, to raise the studs of the tumblers to the same height exactly, at the same instant; if this is not very accurately managed, one or other of the studs will be either caught in one of the upper notches of the bolt, or not disengaged from the lower. The bit of the key is formed as in fig. 15.

Fig. 15.



The arrangement of the wards of this lock, as shown in the key, materially interferes with any attempt that may be made to pick it; and the greater the number of the tumblers, the more difficult still is the operation. Locks on this construction are considered the safest of any that are manufactured, if we except those made according to Bramah's Patent. There are several other descriptions of locks, which we shall describe in a future paper.

RISE AND PROGRESS OF THE SILK MANUFACTURE.

By the written records of China, we are told that the art of converting to their own advantage the labours of the Silk-worm, was known and practised among them 2700 years before the Christian era. Among all the costly materials gathered from various countries for the embellishment of the celebrated Temple of Solomon, no mention is made of Silk, nor yet on the rebuilding of the temple after the captivity.

The victorious army of Alexander the Great brought home, among other Eastern luxuries, wrought silks from Persia; and Aristotle certainly gives the best account of the Silk-worm that is to be found in any ancient author, describing it as a horned worm which passes through several transformations: he fails to indicate the country of its origin. Pliny, whose writings afford evidence of so much erudition, has given an account of the Silk-worm, and assigns Assyria as its native country.

Silk was very little known in Europe before the reign of Augustus, and during a long succeeding period it remained extremely costly, only a small quantity reaching the imperial city by a circuitous and expensive land and water carriage. The increasing luxury of the Roman people caused the demand for silk manufacture to increase much faster than the supply, and the price became exorbitantly high.

Two monks, engaged as missionaries in China, succeeded in obtaining a quantity of silk-worms' eggs, which they concealed in a hollow cane; and at length in the year 552, they conveyed them in safety to Constantinople. The eggs were hatched in the proper season by the warmth of manure; and the worms were fed with the leaves of the wild mulberry-tree. These worms in due time spun their silk, and propagated under the careful tendance of the monks, who also instructed the Romans in the whole process of manufacturing their production. The insects thus produced were the progenitors of the generations of silk-worms which have since been reared in Europe and the western parts of Asia.

Thus, a caneful of the eggs of an oriental insect became the means of establishing a manufacture which fashion and luxury have rendered so important.

The mulberry-tree was then eagerly planted in Europe, for the nourishment of these valuable insect labourers; and on this, their natural food, they were successfully reared in different parts of Greece.

The Venetians soon after this time opened commercial relations with the Greek empire, and continued for many centuries the channel for supplying the western parts of Europe with silks. The estimation in which this manufacture was held, continued sufficiently high for it to be considered worthy of being made a regal gift: it appears that in the year 790, the Emperor Charlemagne gave two silken vests to Offa, king of Mercia.

Rome in 1146.

Although at this period the Roman empire was fast declining, they alone possessed the valuable breed of silk-worms, which 600 years before had been transferred from the remotest extremity of the East; and none others had manufactured its costly spoils. Roger I., king of Sicily, led into captivity a considerable number of silk-weavers, whom he compulsorily settled in Palermo, obliging them to impart to his subjects the knowledge of their art. In twenty years from this forcible establishment of the manufacture, the silks of Italy are described as having obtained a decided excellence, being of diversified patterns and colors; some fancifully interwoven with gold. By degrees the manufacture spread over the greater part of Italy, and was carried into Spain; and in the reign of Francis I., took root in France.

A still longer interval occurred before its adoption into England, and its introduction was very slow, till the beginning of the sixteenth century. Bologna was the only city of Italy which possessed proper throwing mills, or the machinery necessary for twisting and preparing silken fibres for weaving

The business of a silk-factory was considered a noble employment in Venice, and might be followed without degradation by the higher classes.

The silk trade made very little progress in France till the reign of Francis I., who procured artisans from Milan, and introduced them into Lyons. The French then made rapid progress in this pursuit; and, in addition to those of Lyons, many manufactories were speedily started in the southern provinces; supplying sufficient for their own consumption, and soon afterwards a superabundance for competition in foreign markets; furnishing many parts of Europe

with the fruits of their newly-cultivated art; deriving great wealth from prosecuting this branch of trade with England. Queen Elizabeth, in the third year of her reign, 1560, was gratified by being presented with a pair of knitted black silk stockings by Mrs. Montague, her silk woman; at which she was so delighted that she never afterwards condescended to wear those of cloth. Sir Thomas Gresham presented Edward the Sixth with a pair of long Spanish silk stockings, and, from their rarity, this offering was deemed worthy of much notice.

When Antwerp was captured by the Duke of Parma, in 1585, it was consigned during three days to indiscriminate plunder and destruction; and about a third part of their artisans and merchants who wrought and dealt in silk, took refuge in England, where they finally settled, and taught those arts by which they had long prospered in their native land, by which means the manufacture was materially improved in this country.

Every attempt at rearing silk-worms and producing silk having, after endless trials, failed, attention was directed to the establishments for producing both raw and wrought silks in the settlements at British India; where proximity to the country of its original production, the fitness of the climate, and, above all, the cheapness of labour, have contributed to insure complete success. The island of Cossimbuzar and its neighbourhood, in the province of Bengal, are particularly favourable to the labours of the silk-worm. There are at this time eight principal silk filatures, the produce of eight factories, belonging to the East India Company, in Bengal. In every filature there are employed, according to its size, from 3000 to 10,000 people; and if to these were added the mulberry-planters, worm-feeders, &c., the number dependent on each establishment, would be from 10,000 to 40,000 men, women, and children. Silk requires so much care and attention for its production, and so great a number of persons must be employed in an establishment for rearing silk-worms, that it is only in countries where the number of the poorer classes is in great proportion to capital, and therefore labour very cheap, that silk can be reared at an expense which offers successfully to compete with other countries. The silk, consumed in England alone, exceeds four millions of pounds in a year. Fourteen thousand millions of animated creatures annually live and die to supply this little corner of the world with an article of luxury. The importation of raw silk from China in 1829 amounted to 600,000 lbs.

A Lyons newspaper in 1812 states that there were 10,720 looms, employing 15,506 workmen. In 1824 there were 24,000 looms employing 36,000 hands.

In the year 1685, the revocation of the edicts of Nantes compelled many merchants, manufacturers, and artificers, to fly from France. About 70,000 made their way to England and Ireland; many of them resorted to Spitalfields, contributing much by their knowledge and skill to the improvement of the silk manufacture. To them we are indebted for the art of manufacturing brocades, satins, black and coloured mantuas, black paduasoys, ducates, watered satins, and velvets, all of which fabrics had been imported up to the year 1718. Our machinery being very defective, we were in a great degree dependent on the throwsters of Italy for a supply of organzine; but at that time, Mr. Lombe, of Derby, having, in the disguise of a common workman, succeeded in taking accurate drawings of the throwing machinery in Piedmont, erected a stupendous mill for that purpose on the river Derwent, at Derby, and obtained a patent for the sole and exclusive property in the same for 14 years. This grand machine was constructed with 26,586 wheels, and 97,746 movements, which worked 73,726 yards of organzine thread with every revolution of the water-wheel, whereby the machinery was actuated. So rapid was the growth of the silk trade from this time, that in 1783 the estimated value of silk goods manufactured in England was 3,350,000*l.*

A great improvement had been effected (ten years before, viz. 1772) in Bengal raw silk. Better machinery being brought into use on the Italian system, and competent persons employed as heads of each factory. The shipments about this period, being from 515,000 to 560,000 lbs., have steadily increased to 1,500,000 lbs. annually. In Italy there is but one regular crop in the year; while in Bengal there are three at intervals of four months, March, July, and November.

ON GOLD AND SILVER FISHES.

Still had she gaz'd; but midst the tide
Two angel forms were seen to glide,
The Genii of the stream;
Their scaly armour's Tyrian hue,
Through richest purple to the view,
Betray'd a golden gleam.

THESE graceful ornaments of the drawing-room or conservatory are not natives of this country, but came originally from China and Japan, about the year 1691. They belong to the Carp tribe; concerning which we will say a few words, before we speak of the gold and silver varieties of it.

The common carp, *cyprinus carpio*, is furnished with four beards, and a forked tail. It was introduced into a fish-pond at Plumsted, in Sussex, towards the end of the fifteenth century*; but it is said to be found native in the lakes and ponds of Southern Europe, and very commonly in France and Germany. The carp is the least carnivorous among fishes. It is very tenacious of life, and can be carried alive over land for great distances. It has been frequently carried alive from Strasburgh to Paris, by keeping a little wet moss in contact with the gill-lids; and without even this simple precaution it will live for a long time out of water. "And, doubtless," says Izaac Walton, "as of sea-fish, the herring dies soonest out of the water, and of fresh-water fish, the trout, so, except the eel, the carp endures most hardness, and lives longest out of his own proper element. And, therefore, the report of the carp's being brought out of a foreign country into this nation, is the more probable." One of the recent editors of this book says that it is a common practice in Holland to keep carp alive for three weeks or a month, by hanging them in a cool place, with wet moss in the mouth, and feeding them with bread and milk.

The carp does not delight in troubled waters: it loves to haunt placid streams which steal along without any perceptible current; such as the moats and trenches of old castles; or retired shady ponds, where aquatic plants accumulate. It feeds upon these vegetables, and, from the quietness of its habits, it attains a great age. When very old its back becomes quite white. Gesner says, that a carp has been known to live in the Palatine above a hundred years.

* In Sir RICHARD BAKER'S *Chronicle* occurs the following distich:—

"Hops and turkeys, carps and beer,
Came into England all in a year."

In some of the old editions of Isaac Walton, these verses are found to run thus:—

"Hops, reformation, turkeys, carps, and beer,
Came into England all in one year."

How this came to be *known* does not appear; but it reminds us of the story of the old lady, who, being told that the raven lives to the age of a hundred years, bought one on purpose to try. In 1782, a gentleman of Emanuel College, Cambridge, published an account of a carp which had inhabited a small artificial pond in the College for thirty-six years; and that, although the fish had lost one eye, yet it knew, and would constantly swim up to its feeder. Carps are not timid, but rather fond of society; and, as in the instance just given, they are so far capable of being educated, as to come and be fed at stated hours on being whistled to. There are immense numbers of this fish in the stilly part of the Rhine, near Strasburgh; and vast quantities are sent annually to Paris.

The food of the carp is animal, as well as vegetable. It eats worms and aquatic insects, and is also said to swallow the mud at the bottom of its abode for the sake of larvæ and seeds. Hence the flavour of its flesh depends upon the nature of its food. Walton says, in his usual quaint and amusing style, "the tongues of carps are noted to be choice and costly meat, especially to them that buy them; but Gesner says, carps have no tongue like other fish, but a piece of flesh like fish, in their mouth like to a tongue, and should be called a palate; but it is certain it is choicely good, and that the carp is to be reckoned among those leather-mouthed fish, which, I told you, have their teeth in their throat; and for that reason he is very seldom lost by breaking his hold, if your hook be once stuck in his chops."

The general length of the carp is about two feet: specimens have, however, been found of four feet in length.

The frog is said to be the mortal enemy of the carp. Walton says, that a pond, well stocked with carp has been known to lose all its fish in a single summer, in consequence of the depredations of the frogs. He says that a "gentleman of tried honesty" told him that

He saw, in a hot day in Summer, a large carp swim near the top of the water, with a frog upon his head; and that he upon that occasion caused his pond to be let dry; and I say, of seventy or eighty carps, he only found five or six in the said pond, and those very sick and lean; and with every one a frog, sticking so fast on the head of the said carps, that the frog could not be got off without extreme force or killing.

And a person of honour, now living in Worcestershire, assured me he had seen a necklace, or collar of tadpoles, hang, like a chain, or necklace of beads, about a pike's neck, and so kill him; whether it were for meat or malice, must be to me a question.

Let us now speak of the gold and silver carp,—the *Cyprinus Auratus*, of Linnæus.

The former are of an orange gold colour, with very shining scales, and finely variegated with black and dark brown. When young, its colour is dark brown or black, which is afterwards replaced by the orange gold hue. It is naturalized in this country, and in other parts of Europe, and breeds freely in warm and sheltered situations. Our supply is chiefly obtained from Portugal, where this fish abounds. The silver fish differs from the former only in colour, which is similar to silver tissue; it generally has scarlet fins, and is curiously marked in several parts of the body. Both varieties are also subject to variation in the fins, which are occasionally double; and specimens have been seen with triple tails, but such a developement is generally at the expense of some other fin.

When I happen to visit a family [says Gilbert White] where gold and silver fishes are kept in a glass bowl, I am always pleased with the occurrence, because it offers me an opportunity of observing the actions and propensities of those beings with whom we can be little acquainted in their natural state. Not long since I spent a fortnight at the house of a friend, where there was such a *vivary*, to which I paid no small attention, taking every occasion to remark what passed within its narrow limits. It was here that I first observed the manner in which fishes die. As soon as the creature sickens, the head sinks lower and lower, and it stands as it were on its head; till, getting weaker, and losing all poise, the tail turns over, and at last it floats on the surface of the water, with its belly uppermost. The reason why fishes, when dead, swim in that manner is very obvious; because when the body is no longer balanced by the fins of the belly, the broad muscular back preponderates by its own gravity, and turns the belly uppermost, as lighter, from its being a cavity, and because it contains the swimming bladders, which contribute to render it buoyant.

Some that delight in gold and silver fishes, have adopted a notion that they need no aliment. True it is, that they will subsist for a long time without any apparent food, but what they can collect from pure water, frequently changed; yet they must draw some support from animalculæ, and other nourishment supplied by the water; because, though they seem to eat nothing, yet indications of their having eaten are found in their glass abodes. That they are best pleased with such *jejune* diet may easily be confuted; since, if you toss them crumbs they will seize them with great readiness, not to say greediness: however, bread should be given sparingly, lest, turning sour, it corrupt the water. They will also feed on the aquatic plant called *lemna*, or duck's meat, and also on small fry.

Hawkins, the editor of Walton, says that fine gravel should be strewed at the bottom of the vessel containing the fish; "frequently changing the water, and feeding them with bread and gentles. Those who can take more pleasure in angling for, than in beholding them, which I confess I could never do, may catch them with gentles; but though costly, they are but coarse food."

When they want to move a little [continues White] they gently protrude themselves with their *pinnæ pectorales*; but it is with their strong muscular tails only that they, and all fishes, shoot along with such inconceivable rapidity. It has been said that the eyes of fishes are immoveable: but these apparently turn them forward or backward in their sockets, as their occasions require. They take little notice of a lighted candle, though applied close to their heads, but flounce and seem much frightened by a sudden stroke of the hand against the support whereon the bowl is hung, especially when they have been motionless, and are perhaps asleep. As fishes have no eyelids, it is not easy to discern when they are sleeping or not, because their eyes are always open.

Nothing can be more amusing than a glass bowl, containing such fishes: the double refractions of the glass and water represent them when moving in a shifting and changeable variety of dimensions, shades, and colours; while the two mediums, assisted by the concavo-convex shape of the vessel, magnify and distort them vastly; not to mention that the introduction of another element and its inhabitants into our parlours engages the fancy in a very agreeable manner.

Some people exhibit this sort of fish in a very fanciful way: for they cause a glass bowl to be blown with a large hollow space within, that does not communicate with it. In this cavity they put a bird occasionally, so that you may see a goldfinch or a linnet, hopping as it were in the midst of the water, and the fishes swimming in a circle round it. The simple exhibition of the fishes is agreeable and pleasant; but in so complicated a way, becomes whimsical and unnatural, and liable to the objection due to him,

Qui variare cupit rem prodigialiter unam*.

A pleasant association connected with the subject of gold and silver fishes, is Gray's ode on the death of a favourite cat, drowned in attempting to catch them. One of the stanzas of this ode we have placed at the head of this notice.

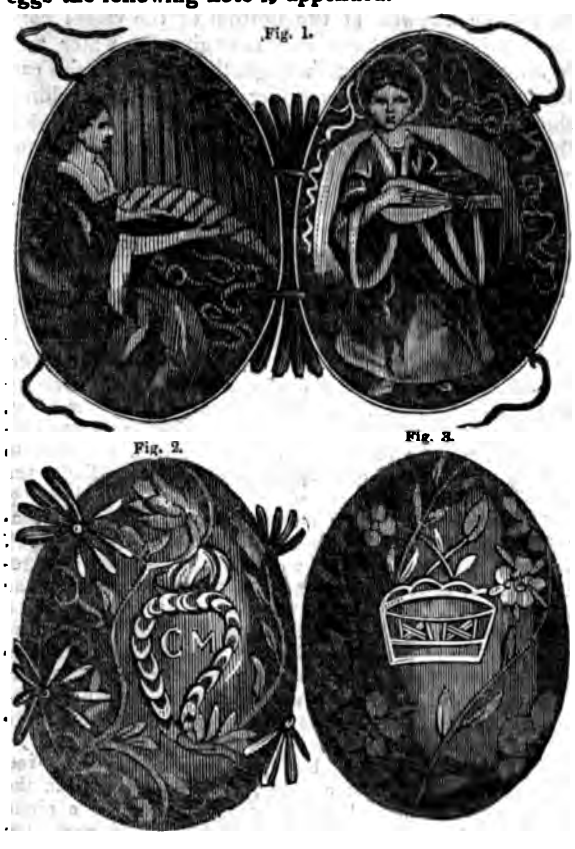
* Who desires to impart a monstrous variation to an object.

EASTER EGGS.

THE custom of making presents of eggs on particular occasions is of great antiquity. In Roman Catholic countries the custom prevails at Easter, where the allusion was evidently meant to be to the Resurrection. In process of time, although the custom still continued, its origin was lost sight of, and a present of eggs, no longer considered as a sacred memorial, became first a sign of friendship, and afterwards a token of affection from one young person to another. Our engraving is copied from an old drawing in the British Museum.

An Easter egg, the which is sawed open with a fine instrument made for that purpose: the shells within are cleaned and dried, then lined with guilded paper, and adorned with figures of saints, made of silk and gold; they are made to open and shut, and are tied together with ribbons. Eggs of this sort are made for presents to ladies of quality. Fig. 1 is the inside showing the figures, and fig. 2 its outside. Two eggs of this description were presented on Easter-day, 1716, to the beautiful young Lady Manfroni, of a very ancient family, by Seignior Bernini, who soon after married her. In Venice, the Venetian noblemen present eggs to the ladies and nuns, adorned with their portraits curiously limned thereon; and in Germany they have ways of adorning eggs with foliage and other devices, all in transparent work, which is cut out with aquafortis.

Figs. 1 and 2 are representations of an Easter Egg, very highly ornamented. Fig. 3 is an egg less carefully decorated, and not cut open; it is one of several others represented in the same volume, from which we have copied the foregoing; to these last eggs the following note is appended.



Eggs after the usage of Rome, painted of various colours, and adorned with figures and emblems. These on Easter-day, are carried to church to the parish priests, who bless them and sprinkle them with holy water. On that day at dinner, the cloth is adorned with sweet herbs and flowers, and the first thing that is eaten are these blessed eggs, which are painted by the nuns of Amelia, a small city about thirty miles from Rome. The common sort of these eggs are all of one colour, as yellow, blue, red or purple, which are sold in the streets till Ascension-day, or Whitsuntide. Anno 1716.

At the present day some remains of this custom are to be found in the north of England, some few of the adepts even taking the pains to saw the shells in half; but the greatest number are distributed among the younger branches of the family by their grandmothers and aunts, who provide according to their means against the occasion.

In Cheshire, children go round the village and beg eggs for their Easter dinner; they accompany it with a short song, begging for "an egg, bacon, cheese or an apple, or any good thing to make us merry," and ending with "and I pray you, good dame, an Easter egg." In Cumberland and Westmoreland the same custom prevails, and *parch* or *paste* eggs are reciprocally sent from one friend to another. The mode of preparing the eggs is by plunging them in hot water for a few minutes, and then writing a name or drawing an ornament on the shell with tallow; the egg is then boiled in water containing any coloured dye in solution; this colour will not attach itself to the shell in any part which has been covered with grease, and consequently all the ornaments will appear white. Another method which requires more skill and labour, is to stain the egg of an uniform colour, and scratch out the ornament or name by means of a pen-knife.

The Easter eggs, which are stained of an uniform colour, afford amusement to the children, in a sort of game in which the strength of the egg-shell is tested. The boy holding an egg in his hand, challenges a companion to give blow for blow: one of the eggs is sure to be broken, and its shattered remains are the spoil of the conqueror, whose egg assumes a consequence in proportion to the number of times it has escaped unbroken. To obtain an egg which, when boiled shall be as hard as possible, the boys are in the habit of watching the hen when she lays, taking the egg immediately from under her, and boiling it at once; by this means the white of the egg becomes harder than if it were boiled at a future time.

IT may not be unimportant, occasionally, to view the extent of the means, and fertility of the sources, whence the botanist can draw his gratifications.

In considering the great number of plants united by such close affinities, yet each one distinct from its congener, the mind can but be strongly impressed with the magnificence of that design of the divine Creator, of which we here catch a glimpse, in the detail of so inconsiderable a portion of his care. It must be kept in view that nature, in the aggregate, presents us with unity of design. We usually examine isolated scraps, to compare their differences; when, however, we consider that all creation is comprehended under one regularly graduated whole; that it exhibits, step by step, a progressive developement, from the lowest quality of inorganic matter, up to man, the most perfect of animated earthly creatures: how utterly incapable are we of tracing those gradations, and almost invisible distinctions, which lead from being to being, through the ascending scale of creation!

These considerations should be impressed on the mind of the young naturalist. None can comprehend all the laws of nature, but the outline of her works is more obvious. We may read the index to her operations, although the details are not unfrequently in secret characters. The whole may be seen as composed of an alphabet of simple elements—elements which combine into matter, as letters into words; matter combines into beings, as words into sentences; and again, as series of sentences make chapters so series of beings constitute classes, and of these the incomprehensible book of creation is compiled, and perfected by the hand of the original lawgiver.—MAUND.

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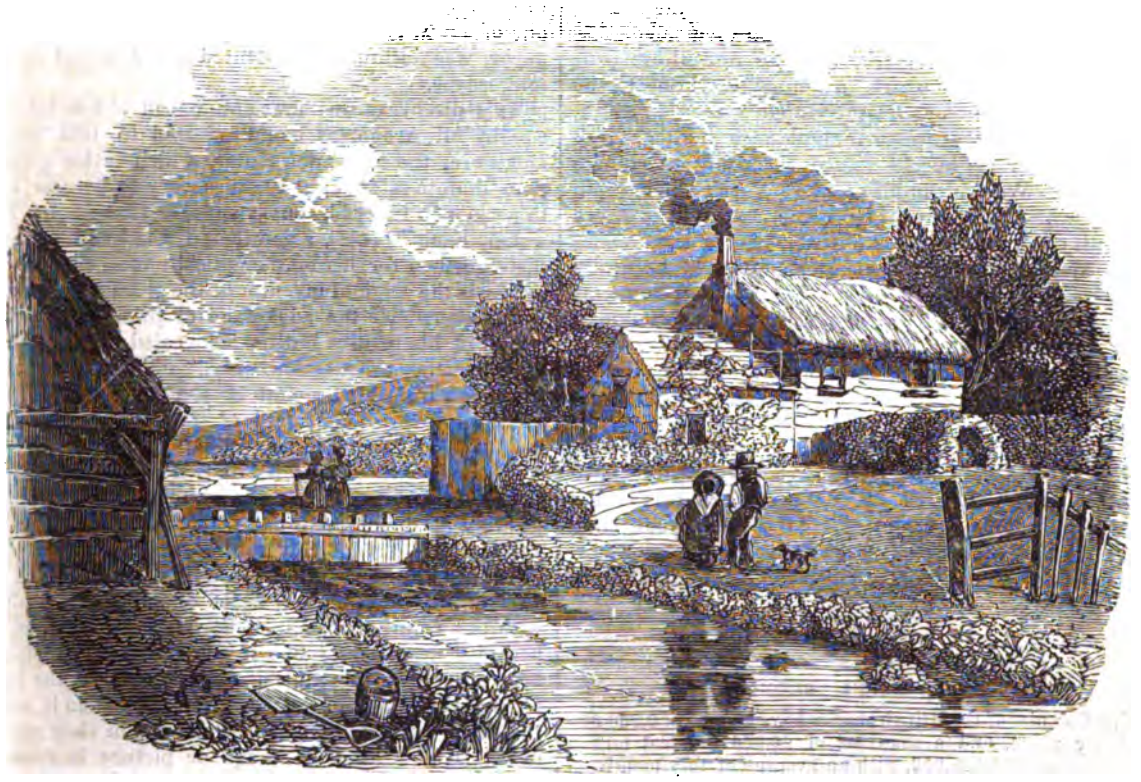
SPRINGHEAD, NEAR NORTHFLEET, KENT.



WATER-CRESS GROUND, AT SPRINGHEAD.

SPRINGHEAD, a pleasantly-situated spot, about a mile and a half from Northfleet, in Kent, close to the small and retired village of Swanscombe, is celebrated for the cultivation of Water-cresses for the supply of the London markets. The quantity of this wholesome vegetable grown expressly for the consumption of the metropolis, is much more extensive than would readily be believed. From Springhead alone two van loads of hampers, containing water-cress, are despatched every day during the Summer, and every other day in the Winter season.

Springhead is the place, near London, where the water-cress was first made the object of cultivation; it was afterwards grown at Mitcham, in Surrey, but the plantation at that place has been neglected. At Springhead about four acres of ground are occupied by the water-cress. At Rickmansworth, and in the neighbourhood of Uxbridge, about fifteen acres are laid down for their growth, and near Waltham Abbey, in Essex, about six acres; but the London market receives considerable supplies from places at a much greater distance, particularly from the neighbourhood of Salisbury, whence they are despatched packed in sacks. The supply from the places we have already mentioned, is brought in hampers, and tied up in bunches. The money received by the wholesale dealers in London is calculated to amount to ten thousand pounds a year; one vender alone, who has received a medal from the Society of Arts for the improvement of water-cress, states his return at fifteen hundred pounds a year.

The attention paid to the growth of the cultivated water-cress, ensures its perfect freedom from the spawn of the small molluscous animals which are found in ditches; and which in the spring of the year, deters so many from the enjoyment of this wholesome addition to the breakfast-table.

At the places we have been describing, the plant is grown in rows on a gravelly bottom, over which a pure stream of clear water, a few inches deep, is constantly flowing: this treatment causes the cress to be fuller in the leaf, and shorter in the stalk, than if it was grown in deeper water or a more confined situation. Close to the building shown in the engraving is a space of water kept entirely clear, and inhabited by a number of beautiful trout; which, from constantly being accustomed to the sight of visiters, are sufficiently tame to allow you to watch their motions with ease, as they boldly move about in the stream.

The scientific name of the water-cress is *Sisymbrium nasturtium*, formerly *Nasturtium aquaticum*. It may be propagated by seeds, or by cuttings from the stem; the root itself is biennial, dying off at the end of the second year, but as fresh fibres spring from each of the upper joints of the stem, it is a matter of no consequence.

The principle on which the pungent taste of the water-cress depends, is extremely volatile, and almost entirely escapes as the leaves dry.

Water-cresses have obtained a place among medical herbs on account of their antiscorbutic qualities, and are considered great purifiers of the blood: in this respect they rank with the celebrated Scurvy-grass of navigators, (*Cochlearia officinalis*) and are recommended by medical authors to be eaten with it as a salad, with the addition of Seville oranges. They are supposed to be always most efficacious when eaten with an acid, such as vinegar. The French are in the habit of expressing the juice of the water-cress, and using it in the preparation of a salad.

It is worthy of remark, that we find those productions of nature which are most essential to the support of man, or most conducive to his health, scattered with the greatest abundance in all parts of the globe, their species varied according to climate and soil. We find, in all quarters of the globe, grain from which bread can be made, but not in every country the same species. In the case of the cresses, the species are very numerous, and yet naturally confined to limited districts. The water-cress seems not peculiar to Great Britain: some species are found on the sea-shore, others on barren heaths, while many will only succeed in water. The American land-cress answers well in a garden, and is worth cultivation, as a substitute for the water-cress. There is one species, (*Sisymbrium trio*,) the London Wild Rocket, respecting which a belief once existed that it was produced by the great fire of London in 1666. It is not confined to the neighbourhood of London, although it grows there in great abundance, but is common in cultivated ground throughout Europe.

THE BRITISH COLONIES.

THE Colonies of the British empire have an area of 2,200,000 square miles, and a sea-coast of 20,000 nautical miles; population, 105,000,000, with an average of fifty mouths to the square mile.

Of Lutherans and Calvinists, there are 800,000; of Dissenters, 700,000; of Roman Catholics, Greeks, Syrians, &c., 1,500,000; of Mohammedans, 26,000,000; of Hindoos, &c., 75,000,000.

The military strength employed is, 56,000 European regulars; 156,000 Colonial (coloured) regulars; and 250,000 Colonial militia (whites).

The Colonial revenues amount to 23,000,000*l.* sterling. The civil and convict expenses defrayed by Great Britain, to 225,000*l.*; the military expenses, to 1,800,000*l.*; and the total expenditure of the Colonies is therefore 25,000,000*l.* sterling per annum. The taxation averages 4*s.* 6*d.* per head. The metallic money circulating in the Colonies is about 5,000,000*l.*, and the paper money about 3,000,000*l.* sterling. Maritime commerce of the Colonies: exports, 30,000,000*l.*; imports, 25,000,000*l.* To Great Britain: exports, 15,000,000*l.*; imports, from 10,000,000*l.* Total shipping annually, in and out of Colonial ports, 8,000,000 tons, of which there are to and from Great Britain, 3,000,000 tons. Vessels built in the Colonies, from 1814 to 1837, 8,975; tonnage, 1,022,937.

The property annually created in the Colonies is estimated at 400,000,000*l.*, and the value of the property moveable and immoveable in the transmarine possessions of the empire in land, houses, stock, &c., at 2,500,000,000*l.* sterling.—MARTIN.

THE consciousness of doing that which we are reasonably persuaded we ought to do, is always a gratifying sensation to the considerate mind: it is a sensation by God's will inherent in our nature; and is, as it were, the voice of God Himself, intimating his approval of our conduct, and by his commendation encouraging us to proceed.—BISHOP MANT

ON PHOTOGENIC* DRAWING.

AT the commencement of the present year, considerable surprise was manifested by the public at the announcement of the startling discovery of a mode, by which natural objects were made to delineate themselves, without the aid of the artist's pencil. The beautiful miniature landscape, which the camera obscura produces, was made to *paint itself upon paper*; and that with a fidelity and minuteness so extraordinary, that a microscopic examination was necessary to bring out all its details. A distant building represented in one of these landscapes was depicted even to the number of bricks in the façade, and a pane of one of its windows being broken and mended with paper, was faithfully represented and detected by the microscope.

This discovery was first announced a few months ago by M. Arago, as communicated to him by M. Daguerre, the dioramic painter, which latter gentleman doubtless thought the discovery to be new, and to pertain to himself; but it appears that Henry Fox Talbot Esq., F. R. S., a gentleman who has long been distinguished for his mathematical and optical discoveries, is the original inventor of the process; although M. Daguerre has the advantage of priority of publication of his results, but has concealed the processes by which they are attained. Mr. Talbot has published both, and from his account of the invention we proceed to inform our readers of the details of this remarkable and valuable invention.

There is a class of salts known to the chemist by the term salts of silver, some of which undergo decomposition by exposure to the solar rays, and become variously coloured. Silver, dissolved in nitric acid, forms a nitrate of the oxide of silver, which is soluble in water. If a sheet of paper be washed with this solution and then set in the sunbeams, it becomes blackened: but if some object be placed before it, which casts a well-defined shadow, the light acting on the rest of the paper would blacken it, while the parts within the shadow would retain their whiteness. Thus a kind of image or picture is formed, resembling the object from which it is derived. But such images must be preserved in the dark, and viewed only by artificial light; because, if viewed by daylight, the same natural processes which formed the images would destroy them by blackening the rest of the paper.

So far this process had long been known. Sir Humphrey Davy and Mr. Wedgwood had investigated the subject, but abandoned it, because the paper, on which the images were depicted, soon became entirely dark, and nothing tried by them would prevent it; but Mr. Talbot was so fortunate as to devise a method of fixing the image in such a manner that it is no more liable to injury from the action of light.

The images obtained by Mr. Talbot's process are themselves white, but the ground upon which they display themselves, is variously and pleasingly coloured. The process, which we shall describe presently, is capable of producing much variety, by merely varying the proportions of the materials employed, and any of the following colours are readily attainable: sky-blue, yellow, rose-colour, various shades of brown, and black. Green alone is absent from the list, with the exception of a dark shade of it, approaching to black. The blue coloured variety has a very pleasing effect, somewhat like that produced by the Wedgwood ware, which has white figures on a blue ground.

The first kind of objects which Mr. Talbot attempted to copy by this process, were flowers and

* From two Greek words, signifying *produced by light*.

leaves. "It is so natural," says he, "to associate the idea of labour with great complexity and elaborate detail of execution, that one is more struck at seeing the thousand florets of an *agrostis*, depicted with all its capillary branchlets (and so accurately, that none of all this multitude shall want its little bivalve calyx, requiring to be examined through a lens), than one is by the picture of the large and simple leaf of an oak or a chestnut. But in truth the difficulty is in both cases the same. The one of these takes no more time to execute than the other; for the object which would take the most skilful artist days or weeks of labour to trace or to copy, is effected by the boundless powers of natural chemistry in the space of a few seconds."

"To give an idea," continues he," "of the degree of accuracy with which some objects can be imitated, by this process, I need only mention one instance. Upon one occasion, having made an image of a piece of lace, of an elaborate pattern, I showed it to some persons at the distance of a few feet, with the inquiry whether it was a good representation; when the reply was that they were not so easily to be deceived, for that it was evidently no picture, but the piece of lace itself."

The reader may probably have heard of one of the legends of that intellectual and extraordinary people, the Germans; where Peter Schlemil sells his shadow, the purchaser of which kneels down in the broad sunshine, detaches the shadow from its owner's heels, folds it up, and puts it in his pocket. By the spells of our scientific enchanter, Mr. Talbot, this most transitory of things, the proverbial emblem of all that is fleeting and momentary, may be permanently fixed in the position which it seemed only destined for a single instant to occupy. Such is the fact, that we may receive on paper the fleeting shadow, arrest it there, and in the space of a single minute, fix it there so firmly as to be no more capable of change, even if thrown back into the sunbeam, from which it derived its origin.

Let us now consider the method of *preparing* what Mr. Talbot calls *photogenic paper*, and the means of *fixing* the design.

A sheet of superfine writing-paper is dipped into a weak solution of common salt, and wiped dry, by which the salt is uniformly distributed throughout its substance. A solution of nitrate of silver is spread over the paper on one surface only, and dried at the fire. The solution should not be saturated, but six or eight times diluted with water. When dry, the paper is fit for use.

There is a certain proportion between the quantity of salt, and that of the solution of silver, which answers best, and gives the maximum effect. If the strength of the salt be increased beyond this point, the effect diminishes, and in certain cases becomes exceedingly small.

"This paper," says Mr. Talbot, "if properly made, is very useful for all ordinary photogenic purposes. For example, nothing can be more perfect than the images it gives of leaves and flowers, especially with a summer sun: the light passing through the leaves delineates every ramification of their nerves."

If a sheet of paper, thus prepared, be washed with a saturated solution of salt, and dried, and again washed with a liberal quantity of the solution of silver, it becomes more sensible to the action of light than it was at first. In this way, by alternately washing the paper with salt and silver, and drying it between times, Mr. Talbot prepares what he calls *sensitive paper*, well adapted to the reception of images formed by the camera-obscura.

The photogenic picture being formed, requires *fixing*; for, if left to the light, the whole surface of the paper which bears it will become of one hue, and the design will of course be obliterated. Two methods of fixing are named by Mr. Talbot; the one is to wash the picture over with a solution of iodide of potassium, whereby an iodide of silver is formed, which is absolutely unalterable by the solar light: the other method is to immerse the picture in a strong solution of common salt, to wipe off the superfluous moisture, and then dry it. Pictures preserved by iodine are of a pale primrose yellow, which possesses the remarkable property of turning to a full gaudy yellow, when exposed to the heat of a fire, and recovering its former colour when it is cold.

The writer of this article has formed several photogenic pictures, with ease and complete success. He will shortly resume the subject, and offer the reader a few directions on the precautions necessary to their formation, and sum up the great advantages which are likely to be derived from this beautiful discovery.

ANCIENT AND MODERN WORKS.

The London and Birmingham Railway is unquestionably the greatest public work ever executed, either in ancient or modern times. If we estimate its importance by the labour alone which has been expended on it, perhaps the Great Chinese Wall might compete with it; but when we consider the immense outlay of capital which it has required, —the great and varied talents which have been in a constant state of requisition during the whole of its progress,— together with the unprecedented engineering difficulties, which we are happy to say are now overcome,—the gigantic work of the Chinese sinks totally into the shade.

It may be amusing to some readers, who are unacquainted with the magnitude of such an undertaking as the London and Birmingham Railway, if we give one or two illustrations of the above assertion. The great Pyramid of Egypt, that stupendous monument which seems likely to exist to the end of all time, will afford a comparison.

After making the necessary allowances for the foundations, galleries, &c., and reducing the whole to one uniform denomination, it will be found that the labour expended on the great Pyramid was equivalent to lifting fifteen thousand seven hundred and thirty-three million cubic feet of stone one foot high. This labour was performed, according to Diodorus Siculus by three hundred thousand, to Herodotus by one hundred thousand men, and it required for its execution twenty years.

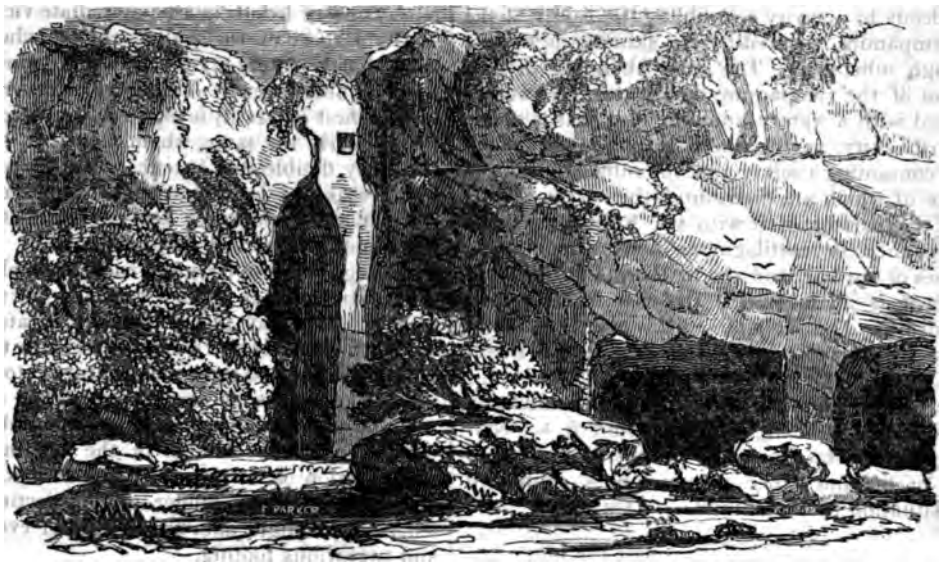
If we reduce in the same manner the labour expended in constructing the London and Birmingham Railway, to one common denomination, the result is twenty-five thousand million cubic feet of material (reduced to the same weight as that used in constructing the Pyramid) lifted one foot high, or nine thousand two hundred and sixty-seven million cubic feet more than was lifted one foot high in the construction of the Pyramid; yet this immense undertaking has been performed by about twenty thousand men in less than five years.

From the above calculation have been omitted all the tunnelling, culverts, drains, ballasting, and fencing, and all the heavy work at the various stations, and also the labour expended on engines, carriages, wagons, &c. These are set off against the labour of drawing the materials of the Pyramid from the quarries to the spot where they were to be used—a much larger allowance than is necessary.

As another means of comparison, let us take the cost of the Railway, and turn it into pence, and allowing each penny to be one inch and thirty-four hundredths wide, it will be found that these pence laid together, so that they all touch, would more than form a continuous band round the earth at the equator.

As a third mode of viewing the magnitude of this work, let us take the circumference of the earth in round numbers at one hundred and thirty million feet. Then, as there are about four hundred million cubit feet of earth to be moved in the Railway, we see that this quantity of material alone, without looking to any thing else, would, if spread in a band one foot high and one foot broad, more than three times encompass the earth at the equator.—Lecount.

PHYSIOLOGY OF THE EAR.



THE EAR OF DIONYSIUS.

A HOLLOW cavern seems the general structure of the organ of hearing, as best fitted for receiving and reflecting sound.

So necessary is this cavernous shape of the external ear to the reception of sound, that we are told the celebrated tyrant of Syracuse, Dionysius, caused a cavern to be formed in a rock, corresponding to the shape of a human ear, where he used to confine his state prisoners; and from the strong vibration, and echoes of the sound, he was enabled to learn the secret conversations they held, and thus condemn or acquit them accordingly.

In the different tribes of animals, it is liable to considerable varieties in the appearance and manner of its formation, and its appendages.

In man it is more perfect in its structure than in any other animal; and it is also of more importance to him than to any other of the creation.

All animals, as far as we know, possess this sense: it was formerly doubted with respect to fishes. The organ of hearing in fishes was first discovered by the late Mr. John Hunter; and is prosecuted at considerable length in his work on *The Organ of Hearing in Fishes*, by the late Professor Monro, of Edinburgh. Thus the modern researches and discoveries in comparative anatomy have sufficiently established their possession of this sense, as well as the other classes.

The impressions the organ of hearing receives, are conveyed through the medium of air, which acquires from the action of the body communicating sound, a tremulous motion or vibration: and as these motions or vibrations succeed each other, sound is impressed, or directed, to the thin membrane stretched obliquely across the auditory passage, named the *tympanum*, where it produces a similar motion; which latter motion carried on, excites a corresponding feeling in the mind.

Though *hearing* is more perfect in man than in any other animal, it is not so at the period of birth: an infant at first hears very imperfectly, and only strong sounds.

In all animals the ear is divided into an external and internal part, and the difference in the structure of the organ of hearing is greater in the external ear than in the internal.

In quadrupeds this difference of structure is more *conspicuous* than in the rest, and this difference or variety seems intended to adapt the animal th for its particular circumstances or mode of l

On examining the external ear in quadrup found to resemble the oblique section of a c near the apex to the base. Hares, and other exposed to danger, and liable to be attacked or beasts of prey, have large ears, and they a cularly directed backwards, while their eye same time, full and prominent, warn them danger in front. Rapacious animals, on the c have their ears placed exactly forwards, as is ble in the lion, the tiger, the cat, and others. the peculiar nature of animals is such as to that sound be distinctly heard from a low sit as for instance, slow-hounds or others—they found to have either large pendulous ears, or them flexible, since they move their heads wi difficulty than man.

Much advantage may be taken of this circu in the construction of mechanical contriva assisting hearing. Some animals keep their the ground, as if impressing the sound more on the organ; and in the case of deaf perso contrivances should be made nearly of a le touch the ground, which would give ample for the reception and retention of sound.

Fowls, again, differ from quadrupeds in ha external ear; but, in place of it, there is a tuf fine feathers, which covers the passage to t this covering allows the sound to pass easily t and also prevents any insects or external which might prove a source of injury, from into it.

To fowls an external ear would have been i nient, as causing an obstruction in the course flight, in passing through thickets, and othe impervious places. In their auditory pass there is situated a liquor to lubricate it, a its disagreeable quality, to prevent the ent insects.

In prosecuting our inquiries further, the ear discovered in insects; it lies at the root antennæ, or feelers, and can be distinctly see lobster and some others of the larger kind.

In the sea-tortoise, the frog, and other am animals, its structure is peculiar, by there external meatus, but an expanded eustachia

the back part of the roof of the mouth, near where the under and upper jaws articulate.

This tube has a winding course behind the upper jaw, and leads to a cavity resembling the cavity of the human tympanum, covered by the skin of the temple and a tough substance. The latter then passes into the bottom of the tympanum, and next into a smaller cavity filled with a watery humour, and last it opens into a third cavity, having three semicircular canals, and a sac containing a soft cretaceous substance, on the membrane of which are distributed the nerves. Thus making a comparison of it with the human ear, the tough substance, or cartilaginous body, supplies the small bones of our ear, and the membrane, to which it is connected, is analogous to the membrane of the foramen ovale. The sac and semicircular canals and nerves exactly resemble the human labyrinth or internal ear.

On the whole, the more we extend our examination of this organ of hearing, we shall find it so constructed, in every class, as to be peculiarly adapted to the mode of life and other circumstances connected with the situation of the animal.—CURTIS.

THE PULPIT ROCKS.

THESE very remarkable rocks are situated in what is called Bald Eagle, or Sinking Spring Valley, on the frontiers of Bedford County, one of the southern tier of counties in the State of Pennsylvania, and about 200 miles west of the city of Philadelphia. To the east of this valley runs an irregular chain of rocky mountains, (one of the ranges or *spurs* of the Allegheny chain,) known as the Canoe Ridge,—and on the western side it is bounded by the Warrior Mountains, a chain nearly as wild and picturesque as the other.

These rocks, which are of gray limestone, have assumed various strange shapes and appearances (for there are several detached masses through the entire length of Sinking Valley); and notwithstanding the general name of Pulpit Rocks, which is applied to the whole, some of them are rude irregular cones and pyramids, while the forms of others convey to the imagination the ideas of stupendous urns, vases, dishes, &c. Unquestionably they are objects of curiosity, and well worthy the attention of those who can duly appreciate the sublime beauties of nature.

Independent of those natural wonders, Sinking Valley obtained a notoriety during the American revolutionary war, on account of the lead ore that was discovered in some parts of it. But on account of frequent molestation from hostile tribes of Indians, and the want of experience of those engaged in the mines, these lead-works were suffered to fall into a state of decay; nor have they, since that period, been considered of sufficient importance to induce any of the occupiers of the lands to re-open them.

Among the chief curiosities of Sinking Valley are "the Swallows," huge fissures in the wall of rock into which two or three mountain streams pour their transparent waters,—which, after flowing through subterranean passages for several miles, may be seen gushing from gorges in the sides of the mountain, without having apparently undergone any material change in size or character. One these streams is of very considerable size, and is known by the name of the Arch Spring; and as the road leading to the old stockade fort traverses this part of Sinking Valley, it is more generally visited by travellers than any of the rest. After this moderate-sized stream has run a course of several miles in a rocky and irregular channel,—having once or twice disappeared amongst the "swallows," and as often burst forth again from its pent-up course,—it is suddenly precipitated over a succession of ledges in the immediate vicinity of some of the largest of the pulpit rocks, when it almost immediately enters a rude arch, the mouth of a vast and singular cavern. This cave or cavern, where the stream first enters it, is eighteen feet high, the width being nearly the same, which, however, soon expands to nearly double that extent. But, in proportion to its increase of breadth, the roof apparently declines, so that the capacity of the cavern continues nearly the same for a considerable distance.

A ledge of loose irregular rocks runs along one side of the stream as it seeks a dark passage through this cavern. In many places they are elevated a few feet above the level of the water, (except in time of high floods,) and afford those who venture into this gloomy grotto the means of scrambling along, although not without some danger, and very considerable difficulty; but at length the channel of the stream, as well as the direction of the cavern, turns abruptly to the left, when there is no longer any projecting points or ledges that might afford the explorer even a slippery and precarious footing.

The whole length of this chasm, for in several places the cavern has openings or clefts in the roof, is nearly a quarter of a mile; while the fall of the stream in that distance cannot be less than from 50 to 60 feet. There are several ledges of rocks over which it rushes with great velocity; so that the thundering of the various cataracts adds not a little to the wild sublimity of the scene. In some parts of the cavern there are piles of drift-wood, that have been brought down from a distant part of the valley, when this mountain torrent has been swollen by the melting of the winter snows, or by some heavy fall of summer rain. In one place, in particular, where the cave suddenly becomes contracted, there are so many small trees piled up, and the limbs and branches of larger ones, that, judging from the appearance of the sides and roof, it seems quite evident at some former period the whole aperture has been completely filled with water, and that the surplus has escaped by the openings in the roof already mentioned.

In another part of Sinking Valley a stream of smaller size than the one above spoken of, finds a romantic passage in a chasm, which is exceedingly narrow, but of the astonishing depth of 300 feet! In particular situations the water is visible at this extraordinary depth, where it may be seen in constant motion, and of inky blackness; although it is as transparent as crystal both before it enters the chasm, and after it gushes forth once more into open day.

Although there seems little doubt that the small streams which become lost in the upper part of the valley are the identical ones that burst forth again from their subterranean passages, yet many experiments have been tried with various light substances, such as chaff, feather, wool, &c.; and yet there is no instance upon record of the substances thus thrown into the streams *above* the "swallows" being recognised where the water issues from the sundry clefts in the wall of rock along the eastern side of the valley.

VOCAL ORGANS OF BIRDS.—In man, and most of the warm-blooded animals, the larynx, or vocal box, forms a protuberance in the front of the throat; but in birds, the same organ is placed at the bottom of the neck, instead of the top.

WINTER IN LOWER CANADA.

As the Winter approaches, one snow storm succeeds another till the face of the whole country is changed. Every particle of ground is covered, the trees alone remaining visible, while even the progress of the mighty river St. Lawrence is arrested in its course—everywhere, in fact, the chilling grasp of Winter is felt, and every precaution is taken by man to resist its benumbing effects. All the feathered tribes take the alarm—even the hardy crow retreats—and few quadrupeds are to be seen; some, like the bear, remaining in a torpid state; and others, like the hare, changing their colour to a pure white. From Quebec to Montreal the St. Lawrence ceases to be navigable, and serves as a road for the sleighs or carrioles. These vehicles vary in shape, according to fancy. The body of the carriole resembles that of a phaeton, a gig, a chariot, or family coach; it is placed on what are called runners, which resemble in form the irons of a pair of skates, rising up in front in the same manner and for the same purposes. The high runners are about eighteen inches, but generally the carriole is about twelve inches above the snow, over which it glides with great ease, on a level surface, without sinking deep; but when calliots (narrow ridges, with deep furrows) are formed in the snow, the motion is like rowing in a boat against a head-sea, producing a sensation, until accustomed to it, somewhat like sea-sickness. The carriole is often mounted with silver, and ornamented with expensive furs.

Instead of the variety which a Canadian Summer presents, in tracing the course of noble rivers, the fall of beautiful cataracts, &c., nothing is now to be seen but one continued solid plain; no rivers, no ships, no animals—all one indiscriminate plain of snow, the average depth of which, (unless where accumulated by snow-storms or drifts,) is about thirty inches.

The dress of the Canadians now undergoes a complete change; the hat and bonnet rouge are thrown aside, and fur caps, fur cloaks, fur gloves, are put in requisition, with worsted hose over as well as under boots: those who take exercise on foot use snow-shoes, or mocassins, which are made of a kind of network, fixed on a frame, and shaped like a boy's paper kite, about two feet long, and eighteen inches broad; these cover so much of the surface of the snow, that the wearer sinks but a very few inches, even where the snow is softest. While the external weather is guarded against by the Canadians when out of doors, their habitations are also secured against the destructive power of intense cold. The walls of the houses are usually plastered on the outside, to preserve the stones from moisture, which, if acted on by the frost, is liable to split them; and the apartments are heated with stoves, which keep the temperature at a higher and more uniform rate than our English fire-places. It has been found difficult to get the plaster to adhere, particularly if exposed to the easterly wind; but, by mixing two pounds of Muscovado sugar with a bushel of lime, a hard and durable rough casting is produced.—MARTIN'S *Colonies.*

SCIENCE deprives itself of its right hand, when, under the influence of a false philosophy, it refuses to turn to the Creator and to inquire of His purposes.—MACCULLOCH.

FROGS.—Before the common frog becomes perfectly developed, it is four years old. Three years are required for the common white grub-worm, found in the deep soil of a garden, to pass through the requisite changes to become a perfect *insect.*

MY YEARS.

I AM not what I was. I feel these years
Have done sad office for me; and that time,
Which I had dreamed might fling around the path
On which I ventured, something of that light
Which cheers life like a halo, has but cast
A sickly shadow o'er my pilgrimage,
And made thus far what I had deemed should be
A course for men to point at and admire,
Only an upward strife of weariness—
A struggle with dark destiny—a toil
In which I've given no lesson to the world
Of that stern toleration which sets crown
On virtue in her trial; because here
I've poured my spirit out in dull complaint,
That should have striven for mastery!

I see
Through the pale vista of my memory,
What once I was, compared with what I am.
I once was buoyant, and my footstep rose
To something strong within me. I gave voice
As in uplifting music, to high thoughts
That spoke of a high nature, that should rise,
So it were true to Him who fashioned it,
Onward, in lofty march up to the skies;
Or, were it faithless, downward to the dust
Our graves are made of! I was certain, then,
There was no power could lure my eye from heaven,
Or that a cloud upon the things of earth
Could come, than midnight quicker and more deep!
But I have found my reason was a child
Without a master—a mere wanderer—
Untaught and learning nothing—till my days
Brought something that reproved me as it passed;
A strong, rebuking spirit, whose dark wings,
Heavy with sorrow, swept but slowly by,
And held me in long shadow, like a night!
Thus was it that I found a punishment
Brought by my years, for giving to the earth
What with my young vows should have gone to God

'Tis not mine to forget. Yet can I not
Remember what I would, or what were well!
Memory plays tyrant with me, by a wand
I cannot master. I may not forget
My visitations, that have shadowed me
Like an eclipse; until my tortured heart
Was weakened like a child's; and like a child's
Scarce knew its duty in its feebleness.
Forgetfulness of sorrow is not mine,
But on me rests remembrance like a ban;
Yet like the flash that plays upon the cloud
In the night season, memory will unveil,
Though for a moment, some dim passages
Of my passed, palled existence. I can see,
As in a dream, how life was when I sprang
Into its highway for the agony
And strain of high contention. I can see
Beyond a vision's clearness, how I went
Cheered as the lark is, to the upper sky
By the unbarring morning; so by shouts
Of men, as they broke round me, in *my* morn!
Life was a panorama of high hope—
A prospect of high travel, and great fame.
I saw upon the future, painted nought
That looked like frowns upon repelling brows,
But only hands that seemed to beckon on
In a still, strange temptation, that my eye
Grew mad with, till the colours of this earth
Took hue like those of heaven; and I forgot
It was the destiny of one to fade,
And that my love was given to! But my years
Here, too, brought knowledge; in that company
Of sadness and repentance, whose dim train
Sweeps on so with experience, that they seem
Like manacled and cowled captives at the car
Of some unmoved and stayless conqueror!

And now how gaze I on that memory
Of that first page I turned for lessons here!
My prayer is to forget the dreamy past—
And senseless to the present, to look on,
And upward with a better constancy,
And holier aspiration, till rebuke

Is merged in mercy, and I feel the clouds
Are bending to receive me, like great wings,
To waft me to the mighty tabernacle
That they are round about.—GRENVILLE MELLEN.

ON THE EARLY MODES OF MEASURING TIME.

No. V. THE SAND OR HOUR-GLASS.

WE find in ancient writings the term *Clepsydra* translated by the word *Hour-glass*; and, as this latter term is now applied to the sand-glass, it leaves us in great uncertainty as to when the flowing of sand was first made a measure of time. Fosbrooke, in his "Encyclopædia of Antiquities," says, that in a basso relievo, at the Mattei palace, representing the marriage of Thetis and Peleus, Morpheus holds an hour-glass in his hand. He also says, on the authority of Atheneus, that people used to carry hour-glasses about as we do watches.

Instead of endeavouring to trace when and where sand-glasses were first employed, we will proceed to give a few practical details concerning them, merely premising that they served their purpose tolerably well, until more useful,—because to a greater extent self-acting,—instruments superseded a contrivance which required at least a horary attendant. The hour-glass is now seldom seen, unless upon the table of the lecturer or private teacher, in the study of the philosopher, the cottage of the peasant, or in the hand of the old emblematic figure of Time, accompanied by the equally emblematic scythe. The half-minute glass is still employed on board-ship, and the three-minute glass is well known under the appellation of an egg-glass, to regulate the time for boiling an egg.

The shape of the hour-glass is not a matter of much moment, but the form generally adopted is that of two pear-shaped vessels, joined at their smaller extremities. These vessels are blown of equal size, and the sand is placed in one of them before the other is joined to it. The best sand is that called *Silver sand*, which, being heated in a crucible or common frying pan to expel all moisture, is then sifted through a fine sieve. A given measure or weight of the sand (known by experience) is then put into one of the bulbs, and the small extremities of the two bulbs are fused together by means of a blow-pipe, in such a manner as to leave a small aperture between the two bulbs, the calibre of which aperture determines the rapidity of the flow of the sand. The bulbs are fixed vertically between two flat pieces of wood, connected together by pillars, and the instrument is now fit for use: the sand falling from the upper to the lower bulb, in exactly the time for which the measure of sand and size of the aperture were calculated.

A method practised in France for constructing sand-glasses is as follows:—Blow four bulbs from one piece of glass tube, so that they may be all connected together in one line, with a narrow length of tube between each two bulbs. Open the two extreme bulbs in the form of a funnel, which may act as pedestals for the instrument to stand upon. Close the narrow opening at one end, introduce the sand at the other, and then close that opening likewise, having previously adjusted the tube which connects the two middle bulbs, so that the sand shall flow with the desired rapidity,

Steady as Truth on either end
Its hourly task performing well.

Egg shell, baked and finely powdered, has been recommended as serving better than sand for these instruments.

The hour-glass is much superior to the clepsydra as a measurer of time; for the flow of the sand from one bulb to another is perfectly equable, whatever be the quantity of sand in the upper bulb: the stream runs no faster when this bulb is almost full than when nearly empty; whereas with water the effect is, as we saw in the last paper, quite the reverse. Until we properly estimate the effects of friction, we are likely to suppose that, when the upper bulb is full, the pressure of sand from above urges the stream more quickly through the aperture at the beginning of the hour than towards the end. That this is not the case, but that the flow of the sand is equable, may be shown by an easy and very pretty experiment.

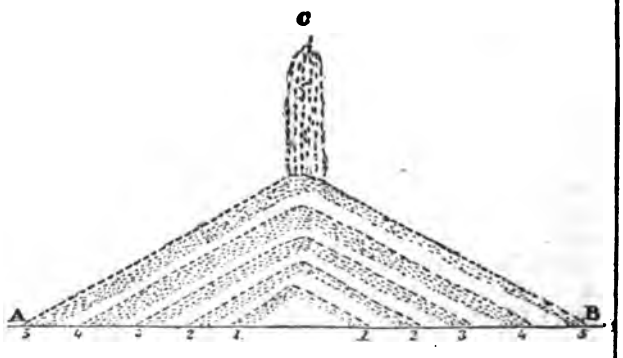
Provide a tube of any length or diameter, and of any material whatever: writing paper will do very well. Close the tube at the lower end, leaving the upper end open. If the tube be made of paper, the best way to construct it is to choose a cylindrical mould, such as a common round ruler, round which roll the paper, and connect the edges with glue or paste. Tie a string round the whole in two or three places, to prevent the paper from starting. When the glue or paste is dry, remove the string and draw out the cylinder; then cover one extremity with a piece of paper, as thin as may be preferred: this may be tied on, or only wetted, so as to adhere by clinging round the bottom of the tube.

Make a hole, about one-eighth of an inch in diameter, in this bottom of the tube: cover this hole tightly with the finger, and then fill up the tube with sand fine and dry: suspend the tube in a vertical position, and remove the finger from the hole, and let the sand flow out into any little vessel which will serve as a measure of capacity. Note the time when the sand begins to flow, and how long time is required to fill this vessel once. When the measure is quite full, stop the flow of sand by covering the hole again, empty the measure, and then allow it to be filled again. It will be found that the time required to fill the measure is precisely the same in both cases, whatever be the extent of the column in the upper part of the tube.

Or, equal measures of sand may in the first place be poured into the tube, say four equal measures: if a quantity of sand, equal to one measure, flow out in a quarter of an hour, we may with certainty predict that three-quarters of an hour will be required for the remainder of the sand to flow out. Or, the tube itself may be graduated into equal parts, and the fall of the sand through one division will be performed in the same time as through any other division of the tube.

While the sand is flowing (provided the tube be made of strong material which will bear rough handling) we may exert whatever pressure we please upon the upper surface of the sand in the tube: we may take a ruler or plug, and force the sand down with our whole strength;—but we shall find that the flow of the sand will not be in the least hastened by that pressure; it will flow on calmly and equably, regardless of the exertions we are making to hasten its progress; but we must not disturb the steadiness of the tube, but fix it firmly in the first case, and make all the comparisons fairly and carefully. If any person have a pop-gun, let him close one end with his finger, and then fill the tube with sand: he will find that not all the force which he can exert at the other end with his rammer will produce the slightest pressure on his finger, or thrust any of the sand out of the tube.

It has been observed, that "it requires a good deal of philosophy to observe common things;" and this remark, so generally true, applies to the present subject. When sand is allowed to fall quietly upon any surface, it forms a conical heap, whose sides form with the base an angle of about 30°: thus, in the following figure, sand falling upon a surface A B from



C, a source above, forms at first the small cone 1 1, which increases to 2 2, 3 3, &c., the sand constantly falling down a conical surface, whose inclination is 30°. A similar fact may be observed wherever mortar is being made. Sand, one of the ingredients of mortar, is sifted through a screen, placed at an angle of about 40° or 50°, and falling through the meshes of the sieve, forms a conical heap on the other side; not so regular as in its steadier flow through a simple hole, but still its angle will be generally about 30°. When sand is tossed out of a cart, or barrow, it falls in the form of this cone.

As sand, therefore, falls at a given angle, it is easy to see the form which it occupies in the tube. The latter is filled by a succession of conical heaps: its bottom bears the pressure of the first heap only; the subsequent strata or additions to that heap transferring their pressure almost entirely to the sides of the tube.

The reason then why the sand flows so equably is, because the lowest heap is not influenced by the pressure of the overlaying strata.

We can easily prove that the base of the tube, before spoken of, supports the pressure of the first conical heap only, by again taking the open tube, and closing the bottom end with a piece of silver paper, wetted at the edges, which are to be folded up on the outside of the tube. If the tube be now filled with sand, it will be found that even this slightly adhering bottom is sufficient to retain the sand in the tube: indeed the only weight the silver paper sustains is the first little heap of sand poured into the tube. In this way many pounds of sand, contained within a tube two or three inches in diameter, may be lifted up from the ground.

With respect to these remarkable properties elicited by the flowing of sand, M. Bournaud observes, that "there is, perhaps, no other natural force on the earth which produces by itself a perfectly uniform movement, and which is not altered either by gravitation, or friction, or resistance of the air; for the height has no influence,—friction, instead of being an obstacle, is the regulating cause,—and the resistance of the air within the column must be so feeble, as to be altogether insensible as a disturbing force."

This curious property of sand disqualifies it for a purpose for which it has been proposed to employ it. Suggestions have been made to naturalists, to load their guns with water instead of bullets, in order to prevent that mutilation of the plumage of birds, &c., of which they are in search. This plan was first adopted by Le Vailliant, in South America, with great success; and sand has been recommended for the same purpose. We do not know whether this latter has been adopted; but, from the foregoing experiments it will be seen how extremely hazardous must be such a trial: the almost certain result would be the bursting of the gun-barrel, inasmuch as a very small quantity of sand would resist the expansive force of the ignited gunpowder.

But this plan has been adopted with much success in blasting rocks. A hole is bored in the rock to the requisite depth, at the bottom of which gunpowder is placed. A long match is then inserted into the hole down to the gunpowder; the whole of it is then filled up with sand: the match is lighted, and burns down to the powder; which, being ignited, the expansive force rends away the rock. It is worthy of remark, and is indeed the point to which we especially allude, that the loose column of sand is not blown out during the explosion.

These properties of solid bodies, when in the form of fine sand or grains, are so remarkable that we have been induced to deviate from the course of our subject to say a few words respecting them. To return, however, we may state that preaching by the hour-glass, was an ancient custom in this country, and still exists in Scotland. So many allusions to the hour-glass are to be met with in the early writers, that it is evident they were in common use. Bacon says, "In sickness, time will seem longer without a clock or hour-glass than with one; for the mind doth value every moment:" and in the words of Sidney, "Next morning, known to be a morning better by the hour-glass, than the day's clearness."

These relics of the olden time, however, as well as sun-dials and clepsydras, have gradually yielded to clocks and watches; and we will conclude by quoting a passage of a quaint writer in the seventeenth century, introductory to a description of the clocks in use at that period.

As time, that little part of eternity, in which the sun shall continue to run his race, is divided naturally into years and days, by the two different motions of that luminous body; so mankind has, by divine direction, been induced to divide the day into yet lesser parts, called hours and minutes; and, as the exceeding great use and benefit thereof is now known to many nations, so, in the most civilized parts of the world, men have been still contriving ways how they may do this with the greatest exactness.

The first and most ancient of all was doubtless that of sun-dials; a noble invention but yet defective, in that it is of use no longer than the sun shines. The next to this, of any value and esteem, was that of the hour-glass, an excellent contrivance, if its usefulness at all times be considered; but the care required to keep it in continual motion did still excite the ingenious to endeavour the discovery of something else that might not only be yet more exact, but free too from the continual toil, as I may call it, and trouble of attendance.—SMITH'S *Horological Disquisitions*, 1694.

DIFFERENCE BETWEEN AN ALLIGATOR AND A CROCODILE.

THE *true crocodile* is found in the river Nile, but by no means in such plenty as in the times of the Pharaohs. The species which is domesticated by the priests, and magnificently provided for in a temple in Memphis, was of a green colour. It was an object of profound worship, called a God, and embalmed when it died. On the other hand, the *alligator* is exclusively found in America; and instead of having an uninterrupted series of teeth round both jaws, as in the crocodile, the fourth tooth of the under jaw shuts into a corresponding socket in the upper one. This law is so universal, that any person by remembering this fact, may with certainty designate the one from the other.

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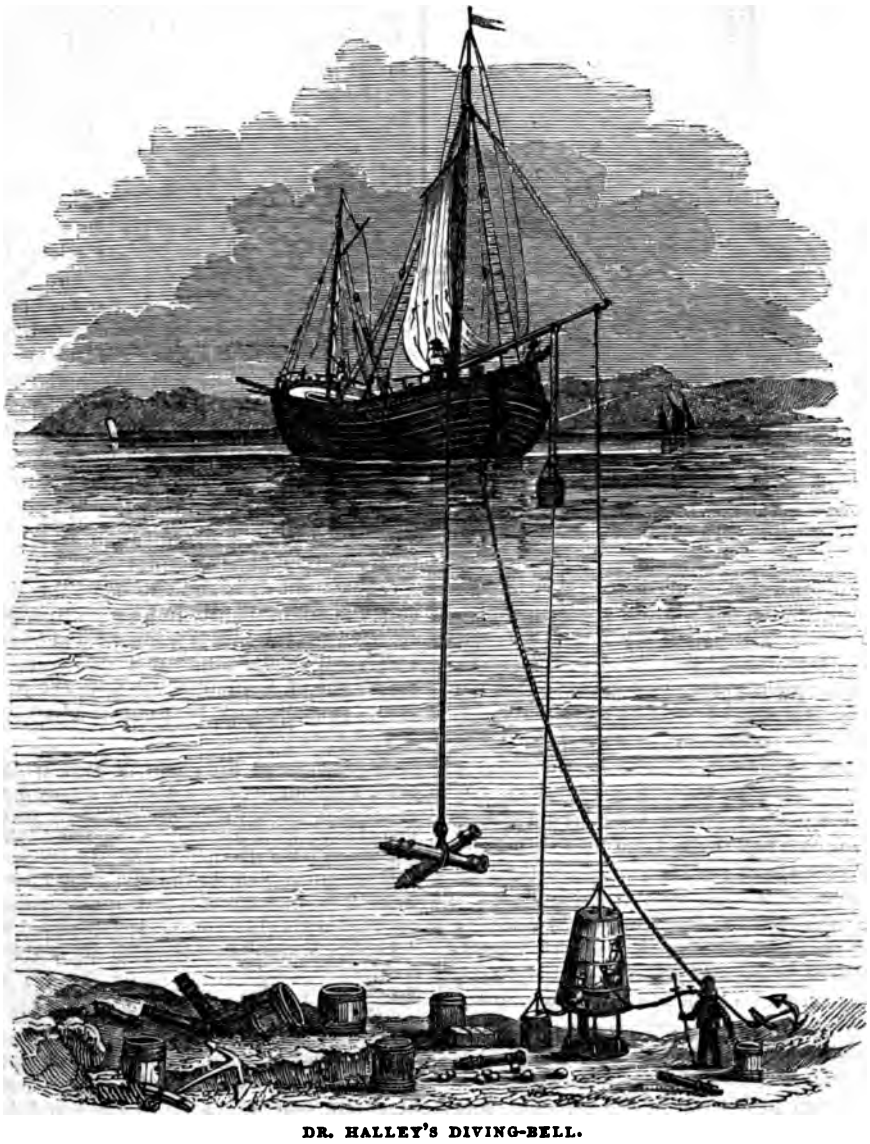
THE DIVING BELL. No. I.



DR. HALLEY'S DIVING-BELL.

It is a remarkable circumstance, that nearly all our most useful inventions are founded upon principles so extremely simple, both in their action and application, as to excite surprise that they should so long have remained unknown. But it generally happens that an inventor magnifies to himself the nature of the object sought to be attained, and creates difficulties where none exist: he constructs extensive and elaborate apparatus, and unmindful of the simplicity of nature's operations, which ought to be his model and his guide, he is not generally content with a simple form of apparatus which he might add to and improve; but he usually constructs one that is intricate in form, and by degrees descends from complexity to simplicity, thus ending where he ought to have begun.

The various forms of diving apparatus, to some of which we alluded in a previous article, were complicated in theory and difficult in practice. The diving-bell in its simplest form is simplicity itself. It is nothing more than a chest or tub, of a conical shape, sufficiently large to contain two or three persons, and being sunk to various depths in water, enables the divers to perform a variety of useful operations.

Although the bell is open at the bottom, it is full of air, so that the water does not enter the bell because the air cannot escape. The reader will understand the whole principle of the diving-bell, by attaching a piece of dry blotting paper to the bottom of a wine-glass: then, inverting the glass, let him lower it steadily into a bucket of water, taking care to hold the glass steadily and to allow the whole rim of the glass to touch the water at the point of immersion. In this way the glass may be lowered to the bottom of the bucket,

and the water will not enter into the glass so as to wet the paper. The reason for this is to be found in a property called *impenetrability* which is common to air as well as to matter generally. By virtue of this property no two bodies can occupy the same place at the same time. What we term an *empty* bottle, is a bottle full of air; and if it be required to fill it with water, the air must first be displaced. If we plunge the bottle under water with its mouth upwards, we hear the air bubbling out exactly as fast as the water enters. The room in which we sit contains air: if a second person enters the room, a quantity of air precisely equal to that person's bulk quits it: so also if we quit the room, a volume of air, precisely equal to the volume of our bodies, enters it.

If the young student in science performs the above experiment with the wine-glass, he will probably observe that a small portion of the interior of the glass near the rim is wetted, thus proving that a portion of the water has actually entered his miniature diving-bell, and that the water enters the glass in proportion to the depth to which he plunges it. This proceeds from another property of the air called *elasticity*, whereby the air, by being subjected to the pressure of the water, diminishes in bulk, and allows a portion of the water to enter the glass; but as soon as the aqueous pressure is removed, the air recovers its former dimensions, and drives the water out of the glass.

Bearing in mind, therefore, these two properties of the air, its impenetrability and its elasticity, the reader will have no difficulty in understanding the following details.

The earliest notice that we find of the use of the diving-bell in Europe, is a description given by Beckmann, of a machine mentioned by John Taisnier who was born in Hainault, in 1509, and held an office in the court of Charles V., whom he attended on his voyage to Africa. He relates that he saw at Toledo, in the presence of the emperor and several thousand spectators, two Greeks let themselves down under water, in a large inverted kettle with a burning light, and rise up again without being wet. It appears that this art was then new to the emperor and the Spaniards, and that the Greeks were requested to make the experiment in order to prove its practicability.

In 1588, when the Spanish Fleet, called the Invincible Armada, sent to besiege England, was dispersed, some of the ships were sunk near the Isle of Mull, on the western coast of Scotland; and these ships were supposed to contain great riches. Many attempts were therefore made to procure part of the lost treasure. In 1665 a person got up some cannon, the sale of which did not realise enough to pay the expenses. On this occasion a rude sort of diving-bell was employed. In 1680, Phipps, a native of America, proposed to procure the treasure from a rich Spanish ship, sunk on the coast of Hispaniola. He laid his plan before Charles the Second, and had a ship and everything necessary to his undertaking furnished to him. He was unsuccessful, and returned to England in great poverty, but with a firm conviction of the possibility of his scheme. A subscription was then raised for him, and in 1687 he made a second attempt, in which he succeeded in getting up treasure to the amount of 200,000*l*. On his return to England, some persons endeavoured to persuade the king to seize both the ship and the cargo, under a pretence that Phipps, when he solicited for his Majesty's permission, had not given accurate information respecting the business. "But the king answered," says Beckman, "with much greatness of mind, that he knew Phipps to be *an honest man*, and that he and his friends should share the whole among them, had he returned with double the value." The king even conferred upon him the honour of knighthood, to show how much he was satisfied with his conduct. The form of diving-bell used on these occasions by Phipps is not well known, but an old writer describes it as consisting of "a square box bound round with iron, which is furnished with windows, and has a stool affixed to it for the diver.

Up to the year 1678 we find several diving-bells of the simplest form described, varying only in shape, capacity, or modes of supension. It is obvious that a diving-bell, into and from which fresh air cannot be admitted, nor foul air discharged, is restrained in its sphere of usefulness from two causes:—1st. The elasticity of the enclosed air being very great, and subject to the pressure of the water, such air yields to the pressure, and allows the water to enter and occupy the lower part of the bell. So great is this aqueous pressure, that at the depth of 33 feet the air becomes compressed to half its original bulk; so that the bell is half full of water and half full of air. 2nd. The air within the bell soon becomes unfit to support life, and the machine requires to be raised from time to time to procure a fresh supply. In order to breathe freely a person requires at least 400 cubic inches of air per minute: if two persons be in the bell, the consumption of air will equal half a cubic foot per minute. If the bell contain about seventy cubic feet of air, we may suppose the supply capable of holding out for two hours; but in practice it is found that after one hour's respiration of the same enclosed air, a fresh supply is absolutely necessary.

When the bell is sunk to considerable depths, and the air is consequently in a state of great compression, great pain in the ears is frequently experienced, accompanied with headach. But these symptoms disappear with use, especially as the air in the chambers of the ears becomes equally dense with the surrounding medium.

The defects of the original form of diving-bell were long experienced in practice, and called forth the ingenuity of many persons in the construction of an improved apparatus. Among others, the most celebrated improver is Dr. Halley, who, about the year 1715, introduced the great improvement of supplying the bell with fresh air for any length of time, without withdrawing the bell from the water. This was effected by letting down from the vessel, from which the bell was suspended, barrels of fresh air, which discharged their contents into the bell by means of pipes, while the foul air escaped by a small cock fixed in the top of the bell. Another great advantage was, that enough air could be thus introduced into the bell to prevent any water from entering, the air in such case being of course in a condensed state; but the whole cavity of the bell became available for working, and the diver could descend and walk on the bottom of the sea, his feet only being under water, while the rest of his body was in the bell, and consequently surrounded with air.

By reference to our frontispiece, which represents Dr. Halley's diving-bell in actual use, the reader will have no difficulty in comprehending the following details.

Dr. Halley's bell was made of wood: its capacity was about sixty cubic feet: its form, that of a truncated cone. It was coated with lead, and the weight of metal was so distributed that it would sink with the mouth always downwards and horizontal. In the top was fixed a strong but clear glass as a window: below the bell was a stage hanging by three ropes loaded with weights for the sake of steadiness.

The bell was suspended from the mast of a ship by a sprit, well secured to the mast-head, and directed by braces to carry it overboard, clear of the ship's side, and to bring it again within board, as occasion required.

The supply of air to the bell was managed by means of strong barrels, cased with lead, so as to sink when full of air; each barrel held about thirty-six gallons. A bung-hole was fixed in the lower part of each, to let in the water as the enclosed air became condensed during the descent, and to let the water out again when they came up to be filled with air; a hose or pipe in the top of each barrel admitted the air into the bell, the pressure of the water from below forcing the air out of the barrels along the hose into the diving-bell. These two barrels were connected with an endless rope, and were made to ascend and descend alternately; the descending barrel containing air, and the ascending barrel water. In the descent the barrels were directed by lines fastened to the under edge of the bell, which passed through rings on both sides of the leathern hose in each barrel; so that sliding down by these lines, they came readily to the hand of a man who stood on the stage, on purpose to receive them, and to take up the ends of the hose into the bell. Through the hose, as soon as their ends came above the surface of the water in the barrels, all the air was blown with great force into the bell, the water entering at the bung-holes; and as soon as the air of one barrel had been thus received, upon a signal given it was drawn up, and at the same time another descended, and thus an abundant supply of fresh air is maintained within the bell.

Dr. Halley says,—

I myself have been one of five who have been together at the bottom of nine or ten fathoms water, for an hour and a half at a time, without any sort of ill consequence; and I might have continued there as long as I pleased, for anything that appeared to the contrary. Besides, the whole cavity of the bell was kept entirely free from water, so that I sat on a bench which was diametrically placed near the bottom, wholly dressed, with all my clothes on. I only observed that it was necessary to be let down gradually at first, as about twelve feet at a time; and then to stop and drive out the air that entered, by receiving three or four barrels of fresh air before I descended further. But being arrived at the depth designed, I then let out as much of the hot air that had been breathed, as each barrel would replenish with cool, by means of the cock at the top of the bell; through whose aperture, though very small, the air would rush with so much violence as to make the surface of the sea boil, and to cover it with a white foam, notwithstanding the weight of the water over us.

Thus I found that I could do anything that required to be done just under us; and that by taking off the stage, I could, for a space as wide as the circuit of the bell, lay the bottom of the sea so far dry as not to be over shoes thereon. And, by the glass window so much light was transmitted, that when the sea was clear, and especially when the sun shone, I could see perfectly well to write or read, much more to fasten or lay hold of anything under us that was to be taken up. And by the return of the air-barrels I often sent up orders written with an iron pen on small plates of lead, directing how to move us from place to place as occasion required. At other times, when the water was troubled and thick, it would be as dark as night below; but in such cases I have been able to keep a candle burning in the bell as long as I pleased, notwithstanding the great expense of air necessary to maintain flame.

Seeing the success of these attempts, a mind like that of Dr. Halley was sure not to rest satisfied with the capabilities of his diving-bell; he tried to improve it so far as to allow the divers to quit the bell, and walk about on the bottom of the sea, with full freedom to act as occasion required. He constructed caps of lead for the divers to wear, so as to keep the head dry, and receive a constant stream of fresh air from the diving-bell by means of a flexible pipe, one end entering the cap, and the other the diving-bell; this pipe was carried by the diver coiled up on his arm, so as to enable him to lengthen it in proportion to his distance from the bell. Some of these pipes were forty feet long, the size of a half-inch rope. The end of the pipe which opened into the cap, was furnished with a stop-cock, the use of which was to prevent the return of the air in the cap, when the diver stooped down, or got below the surface of the air in the bell, as always happened when the diver got in or out of the bell.

In order to enable the diver to walk about in the water, and to resist any currents he might encounter, it was necessary to diminish his natural buoyancy by attaching weights to his person. The leaden caps were made to weigh between fifty and sixty pounds each; leaden weights were added to the man's girdle, and two clogs of lead were attached to the shoes. Thus it was found, that a man could stand with ease in an ordinary stream, and even move against it. The diver was clothed in thick woollen drawers, and a waistcoat of the same stuff, which becoming full of water would be a little warmed by the heat of the body, and keep off the cold of the surrounding water.

In order to enable the diver to see, the cap near the face was prolonged, and glasses fixed in apertures opposite the eyes. In tolerably smooth and clear water, the diver was enabled to perform a variety of useful offices, with almost as much ease as if he were on land.

This (says Dr. Halley) I take to be an invention applicable to various uses, such as fishing for pearls, diving for coral or sponges, and the like, in far greater depths than has hitherto been thought possible. Also for the fitting and placing of the foundations of moles, bridges, &c., in rocky bottoms, and for the cleaning and scrubbing of ships' bottoms when foul, in calm weather at sea.

We have thus traced the progress of this useful invention up to the time of Dr. Halley; its further progress up to the present day will form the subject of another article.

FRUIT TREES.

It is presumable that the chesnut always grew in Italy, and the cherry in France; but different kinds, on account of their superior excellence arising from cultivation, were imported by the ancient Romans. Wherever their arms extended, they availed themselves of the choice fruits of the conquered countries, and the great generals who brought them to Rome took pride in giving them their own names, as in memory of some great service or pleasure they had done their country; so that not only laws and battles, but several sorts of apples or *mala*, and of pears, were called Manlian and Claudian, Pompeian and Tiberian, and by several other such noble names. Thus, in process of time, the inhabitants of Italy, who formerly lived on acorns, made the whole world tributary to their subsistence, as well as to their glory. Humboldt, in his *Account of New Spain*, says that the *Prunus avium*, or wild cherry, is indigenous in Germany and France, and has existed from the most remote antiquity in their forests, like the robur and the linden tree; while other species of cherry-trees, which are considered as varieties, become permanent, and of which the fruits are more savoury than the *Prunus avium*, have come to those countries through the Romans from Asia Minor, and particularly from the kingdom of Pontus.

Turnips and carrots are considered indigenous roots of France: our cauliflowers came from Cyprus, our artichokes from Sicily, lettuce from Cos, and shallots, or eschallots, from Ascalon. The art of gardening was introduced into England from the Continent about 1509, prior to which, most of the present produce of kitchen gardens was imported from the Netherlands.

RECREATIONS IN NATURAL PHILOSOPHY.

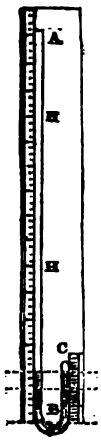
No. XIII.

ON THE ELASTICITY OF THE AIR (*continued*).

A STEEL spring can be said to be elastic, only when it is bent, because it loses its tension, or elasticity, as soon as it is allowed to repose in an unconstrained position: but the air is always in a state of tension, since it is constantly endeavouring to occupy a larger space: hence a given volume or bulk of air depends upon the pressure to which it is subjected, at any given temperature: or, to state the law a little more precisely, *volumes of gas are in the inverse ratio of the pressures which they sustain.*

This law can be demonstrated by a very simple apparatus shown in fig. 1. It consists of a long glass tube, curved near the end, so as to form a shorter branch, B C, parallel with the first, B A. This shorter branch is closed at the end, but the longer branch remains open, in order that the contents of the tube may be exposed to atmospheric pressure. A small quantity of mercury is poured into the tube, and inclined, so as to remove a portion of air from the short branch, so that the metal may stand at the same level in both branches. When such is the case, the air in the short branch is subject to atmospheric pressure only. If now, by any means, the air in B C is made to occupy only the half, the third, or the fourth, of the length B C, we then know that the air is reduced in volume, to one-half, one-third, or one-fourth of its original volume, because the tube is cylindrical. Now when we say that the air in B C is under atmospheric pressure, we mean that the air is in such a state of density, that its pressure is equal to about fourteen and a half pounds on every superficial square inch; and, as such, is capable of supporting a barometrical column of 30 inches of mercury.

Fig. 1.



If the barometer stand at 30 inches, and at that time we enclose a portion of the atmospheric air, or any gas, in a glass tube, such as A B, fig. 1, it is obvious that we take a portion of air capable of maintaining the barometric column at that elevation. If the barometer indicate 29 inches, the air is obviously less dense than at 30 inches. If it indicate 31 inches, the density is proportionally increased. Now the *mean* height of the barometer at the level of the sea is 30 inches, which is equal to a pressure of *one atmosphere*, or fourteen and a half pounds on the square inch. Supposing now that we pour into the tube at A a portion of mercury, equal to 30 inches, and that the level of the mercury in the longer branch is now at H, what is the consequence? we no longer find the air in the tube B C occupying the space from the lowest dotted line up to C, but it has diminished one-half, and its level corresponds with that of the middle dotted line. The air is now under a pressure of two atmospheres; viz., 30 inches of mercury, equal to one atmosphere, and the atmospheric pressure on the summit of the column, equal to another atmosphere. By continuing to add mercury to the long branch we shall find that a pressure of three atmospheres is necessary to reduce a volume of air to one-third of its original volume; four atmospheres to reduce it to one-fourth, and so on.

Hence it will be seen, that the proportion in which the volume of air is diminished, is precisely that in which its power of resistance is increased. If the volume of air be diminished one-half, its resisting power is doubled; if diminished to one-third, it is tripled; and so on, up to sixty atmospheres. Beyond this limit we cannot be quite sure of the application of the law, although M. Œrsted has subjected air to a pressure of 110 atmospheres; and such was the resistance of the air, that his apparatus became deranged, and vitiated the results. Many of the gases become liquefied, when subjected to great pressure, and in such state the above law does not of course apply to them.

The tension of a gaseous body contained in a close vessel may be known and regulated by means of a little instrument, shown in fig. 2, consisting of a tube bent twice, and open at both ends. In the middle of the tube a bulb is blown, and a portion of mercury is contained in two of its branches. The action of this instrument, (which is called a *safety-tube*), is as follows:—the lower open end is fixed air-tight into the vessel containing the gas: if the gas be in the same state of tension as the surrounding air, the level of the mercury will not be disturbed: if the gas be more condensed than the exterior air, it will press upon the surface of the mercury in the middle branch, and force it to a height in the outer branch depending upon the difference between the elasticity of the enclosed and external air. If the tension of the enclosed air be less than that of the atmosphere, then the latter will prevail, and force the mercury up towards the bulb: if this difference be very great, the whole of the mercury will be forced into the bulb, and a portion of atmospheric air will enter and pass down into the vessel, to compensate for the difference in the respective tensions of the two airs: the mercury will then fall down, and occupy a portion nearly the same as that shown in the figure.

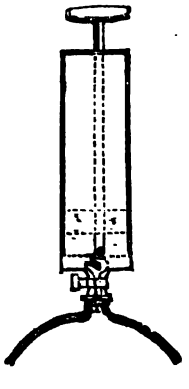
Fig. 2.

This little instrument is called by the French a *Manometer*. Its uses are various and important. It has been frequently employed in researches on animal and vegetable bodies: the central bulb has been so constructed as to contain an animal or a vegetable, and the presence of either body has materially altered the state of tension of the enclosed air, as indicated by the variation in the level of the mercury. In chemical operations, explosions and absorptions are frequently prevented by this safety-tube. In gas-works, where a certain pressure is necessary to distribute the gas through the pipes which supply a whole town, this little tube indicates the state of pressure employed, and points out when a variation is necessary. In the smelting of metals this tube indicates the state of tension of the air employed to excite the blast-furnace, &c.

That apparatus which is employed to diminish the tension of the air is called an *air-pump* or an *exhausting syringe*.

Similar to the latter, but contrary in its action, is the *condensing syringe*, shown in fig. 3. The vessel in which air is to be condensed, must be of metal, and excessively strong, on account of the increasing resistance of air in proportion to its density. This vessel is shown in part in the figure: it is furnished with a stop-cock, to which the syringe is screwed. This syringe is nothing more than a brass cylinder, containing a piston working air-tight, with a valve opening downwards (as at *a*), fixed at the bottom of the syringe. The vessel being full of air of the same density as the external air, the syringe is screwed on, and the piston moved to the top of the cylinder. Air from

Fig. 3.



without will enter at the aperture *t*, and fill the cylinder from below the piston downwards. On pressing down the piston, the air will be condensed and the valve forced open; and the air, having no means of escape, is forcibly driven into the vessel already full of air, and now containing an additional portion. As the valve *a* opens downwards, the attempt of the air to escape operates in keeping the valve more firmly closed. The piston is now drawn up so as to clear the hole *t*, more air rushes in to fill the cylinder, the piston is again depressed; the valve opens, and a second additional quantity of air is forced into the vessel. By a repetition of these processes, the air in the vessel may be brought to an enormous and even dangerous degree of tension. A few years ago, a gentleman, well known in the scientific world, met with his death by the bursting of a vessel containing condensed air. Before the syringe is removed, the stop-cock is, of course, closed.

We will conclude this article with an account of a very ingenious scientific toy, shown in fig. 4.

A tall cylindrical glass jar is nearly filled with water: little hollow glass figures of men, in various attitudes, and bearing each a glass bulb on its head, are filled with water, leaving the glass bulb full, or nearly full, of air. Each figure has a small hole in it, situated near the heel, through which water may pass, in or out. To fill them with water, they are plunged under the surface of that liquid; a fine capillary tube is passed into the hole, the air is sucked out, and the water enters: enough air is left in the bulb that each figure shall be a little lighter than its own bulk of water. The figures are now placed in the glass of water, the mouth of which is then to be covered, air-tight, with a sheet of India rubber. On pressing upon this cover the figures are instantly set into motion, descending in the water, and rising again when the pressure ceases. By modifying the pressure they can be made to sink, to rise, to remain still, or to dance. The jar is sometimes inverted, and the cover passed through a hole made in the table, and the exhibition produces all the motions by pressing, with his foot, a lever connected with the cover; and the figures then appear to the astonished spectators to obey the word of command of their master.

Fig. 4.

But the young student will not be so deceived: he will already have perceived that the varying elasticity of the air produces all these motions. The pressure on the cover of the jar first condenses the air immediately below: this condensation produces a similar effect on the water throughout its whole extent, (for fluids exert their pressure in all directions, and as a whole,) and thus the air in the glass bulbs which the little men wear, is compressed into a smaller space, more water entering each figure through the aperture: each figure therefore becomes heavy enough to sink. When the pressure ceases, the air in the bulb expands, in virtue of its elasticity, forces out the additional portion of water that had entered the figure while the pressure continued, and thus, becoming again lighter than its own bulk of water, it ascends.

If the specific gravity of each figure be very nearly equal to that of water, the figures, having once sunk to the bottom, will not rise again, because the pressure of the liquid column from above prevents the air from regaining its former dimensions, and the figures thus remain permanently heavier than their own bulk of water, and cannot ascend.

So also, if we place several flat leaden weights upon the cover, so as to sink the figures to the bottom; and if, on the removal of all the weights, the figures rise, we shall find than a less weight is necessary to retain them at the bottom of the jar, than was originally employed to sink them. For example: we place five one pound weights upon the cover, and these are just sufficient to sink the figures: we take off one weight, and the figures do not rise: we take off another, and still they do not rise; although they show indications of doing so, by a slight motion: we take off a third weight, and the figures rise rapidly. Hence, although five pound weights were necessary to sink the figures, yet three pounds are sufficient to retain them sunk; the remaining two pounds being made up by the pressure of the liquid column above them.

If the little figures be delicately made, and poised in water, so that a slight increase of pressure is sufficient to sink them, the varying pressure of the air will cause them to occupy different positions in the jar; and thus, this toy acts as a barometer

This beautiful little toy is instructive: if the student understands completely its action, he is in possession of a good deal of knowledge belonging to the branches of science, called Pneumatics and Hydrostatics. This toy proves,—1st, that air is *material*, because it acts as a mechanical force, communicating the pressure it receives to the liquid column;—2nd, That air is *compressible*, because the air in the bulb can be made to occupy a smaller space;—3rd, That air is *elastic*, because when the pressure is removed, it returns to its former volume;—4th, That air is *light*, but, nevertheless, has weight; it is light, because, although the figure is full of water, the air in the bulb buoys it up;—5th, That *fluid pressure* is exerted in all directions; for we first compress the air under the cover, that pressure is transmitted to the water, and that again to the air in the bulb;—6th, That *pressure* among liquids *is as to the depth*; for although it took five pounds to sink the figures, three pounds were sufficient to retain them sunk, the fluid pressure supplying the remainder;—7th, That *fluids support solids*, according to the difference between the weight of the solid and that of the bulk of water displaced. Now as every solid plunged into water displaces its own bulk of that fluid, such body will float if it be lighter than its own bulk of water; it will sink if it be heavier, and will remain suspended in any part of the liquid if its weight remains the same.

It will be our duty as we proceed, to call the attention of the young student to many other toys, from which we hope to extract a great deal of scientific knowledge.

Examining carefully the internal structure of the perfect animal and the perfect vegetable, and observing minutely the manner in which both are fed and nourished, we find a very striking resemblance between the organs of digestion, circulation, and respiration of both; for they display the most remarkable property of organized beings, as distinguishing them from dead inorganized matter,—that of internal nutrition and growth. They receive into themselves foreign and dead substances, and change them within their own organs to different substances; throw off from themselves such as are not needed for the support of the being, and expose the rest to the air, or breathe upon it, and then from this select one portion for supplying the waste of the body, another for the growth, forming out of it all the varying substances which enter into the man or the tree.

Vocal Organs of Birds.—In man, and most of the warm-blooded animals, the larynx, or vocal box, forms a protuberance in the front of the throat; but in birds, the same organ is placed at the bottom of the neck, instead of the top.

MATERIALS FOR THE TOILETTE. III.

A Looking-Glass.

If we had a looking-glass for the mind, as faithful, as uniform, and as spotless, as that which reflects the face, should we not be the better for it? Should we not discover the weaknesses, the bad propensities, the deformities of our minds? Surely such would be the case; and as surely should we be drawn to ponder on our faults, and endeavour to eradicate them.

But the inquiry into the best mode of obtaining a *mental* looking-glass is too extensive and serious a subject to be mixed up with our present inquiry, which relates to a reflector of another kind.

How often have we, when children, looked at the back of a glass to endeavour to discover where the person is, whom we think we see on viewing the front. How frequently do we see a dog or a cat make an angry snap at the impertinent opponent whom he sees in the glass? These are proofs of the fidelity with which the reflection is rendered by the glass; and form, as the mind expands towards maturity, a most admirable subject for study. We may suppose a boy, eager to discover the causes of things, whenever an opportunity offers for so doing, to take a dressing-glass, and to remove the board from the back in order to discover the secret of its formation. He sees the hinder surface of the glass covered with a silver-looking substance, with a slight lustre, but no power of reflecting the features of a person who looks at it.

Influenced by a feeling similar to that which actuated a celebrated personage well known in every nursery, who performed a certain operation on a pair of bellows for a certain purpose—he scrapes off some of the metallic substance at the back of the glass, and then finds that he has reduced the latter to precisely the same state as window-glass,—that is, he can see *through* it, but cannot see his face reflected *from* it.

He then feels himself justified in supposing that the source of the reflected image of his face must be in the metal itself, and not in the glass to which it is attached. He hears people call the dressing-glass a *silvered* glass, and therefore supposes that a coating of silver is laid on the glass. He may then ask, "If it is the silver which reflects, why do they not use a sheet of silver at once?—What use is the glass?" The young querist, if he asks any one who knows anything about it, now learns that the metal is *not* silver, but *quicksilver*, of which the scientific name is mercury; that mercury is, in our climate, always in a fluid state, the only metal which is so;—that a fluid could not be used as a looking-glass or mirror, for obvious reasons;—that the sheet of glass is merely a substance used for attaching the mercury to; and that a transparent substance such as glass, is employed for the purpose, in order that nothing should impede the passage of the light to and from the mercury,—transparency being merely that property in a body which allows light to pass through it.

These are the facts which the young inquirer learns, and few things are more attractive and remarkable than these. If he extend his inquiries still further, he will find that a reflection of his face will be afforded by the transparent piece of glass, without the aid of any mercury behind it, although that reflection is too faint to answer the purpose for which a dressing-glass is employed. Let him take a piece of transparent plate-glass, or even window-glass, and hold it so that light can fall on his face but not on the glass, he will see a faint image of his face reflected from it.

When he extends his studies into the beautiful science of optics, he will find that all these things are in perfect accordance with the laws which have been found to prevail in that science. Every visible body, whether it be a luminous object, such as the sun, or a candle; or an illuminated object, such as a sheet of paper, a green field, the wall of a room, or other non-luminous body, sends forth rays of light in every direction; which rays preserve a straight line in their course, so long as they meet with no obstacle. but if they meet with an obstruction, they either pass through the obstructive body, or are reflected from it, or are stopped or stifled by it.

Now in the case of a looking-glass, the philosophy of the matter is as follows:—We always, when "looking at ourselves in the glass," stand where the light falls on the face. This light is reflected from the face, and proceeds towards the looking-glass, as well as towards other parts of the room. When it meets with the surface of the glass, a solid obstacle is opposed to its progress; but it so happens that glass is a substance which, though solid, permits light to pass through. When the light reaches the hinder surface of the glass, and penetrates through it, it then meets with a substance which refuses a passage to it. the mercury is opaque, that is, it has not the property of allowing light to pass through it. What is now the result? What becomes of the light? A small portion of it is absorbed or stifled (for philosophers do not yet know which is the better term to apply to it) by the substance of the mercury; and the rest is reflected, or driven back, through the glass again, and then enters the eye of the spectator.

Now, although this has taken us several words to describe, all of this routine takes place in an incredibly short time. When we stand before the glass and look into it, we see the image of the face instantly, and we are not in the slightest degree aware that any particular process has been gone through before the image is presented to us. In fact, however, the whole of the circumstances to which we have lately alluded, occur *after* we place ourselves in front of the glass, and *before* the rays of light, or the image, reach the eye, and yet these two events seem absolutely simultaneous. If a lady should say, "I think I am pale to day, I will look;" she does not expect to wait standing before the glass until certain optical phenomena have been completed, before she can see whether she is pale or not; she expects to ascertain the fact at once, the instant she looks in the glass; and turns away from her "facial monitor" pleased or displeased, confirmed or shaken in her opinion respecting her paleness,—but without giving a thought of the optical means by which the reflection had been afforded, and still less that the reflection was really *not* afforded until certain events had transpired.

Yet it is most true that *time* does elapse before a reflection of the face is afforded by the glass. The rays of light proceeding from the lips of the spectator, for instance, traverse the space intervening between him and the glass, enter the glass, traverse its thickness, are reflected from the mercury at the back, traverse the thickness of the glass again in the opposite direction, emerge from its front surface, pass through the space between the glass and the observer, and enter into his eye, and he then says "he sees his own lips in the glass." Now all this is done in a due and regular order, one process following another, and *time* must indisputably be consumed in so doing; but when we come to speak of millionth parts of a second of time, it is sufficiently explained why we cannot perceive that a time elapses between the presentation of the face before a looking-glass and the

reflection of an image of the face. The light of the sun has to perform a journey of nearly one hundred millions of miles before we are blessed with a sight of him; and how long does the reader think the rays of light are traversing this distance?—Eight minutes and a quarter!—at the rate of two hundred thousand miles per second!—nearly as far as from the earth to the moon in one second! We need not, therefore, charge ourselves with much inaccuracy, if we say, as every one thinks, that the reflection of the face takes place at the very instant that we look in the glass.

We have said, that when the light passes through the glass, it is reflected from the mercury which is behind, and this is certainly the reflection to which our attention is directed when we look in the glass. But there are two other reflections going on at the same time, but so slight as to escape notice. When rays of light fall on the front surface of the glass, they do not *all* penetrate it, but some are reflected at that surface. Again, of those which *do* enter the glass, all do not penetrate to the mercury, but some are reflected from the hinder surface of the glass, before they reach the mercury. If we hold a looking-glass in an oblique direction, and place any object, such as a shilling, upon it, we shall see two reflections of the shilling,—a bright one from the mercury and a faint one from the front surface of the glass; and there is also a third, from the hinder surface of the glass, but it is too near that from the mercury to be visible: the more obliquely we view the reflection, the more evident do the fainter ones become.

If we take a piece of window-glass, and blacken the back of it, so as to prevent light from passing through it, we obtain a reflection of the face, which, although altogether inferior to that from a silvered glass, is yet sufficient to show the features. Now it is found that this reflection does not come from the front surface, but from the hinder surface of the glass; or, rather, that it is a combination of the two, but that the hinder is the stronger. When, therefore, we look into a silvered glass, we actually obtain *three* reflections,—one from the front surface, one from the back surface, and one from the mercury, although the last-mentioned is so much the most vivid, that the other two entirely escape our observation.

Who does not remember the wonderful effects of the wonderful mirrors produced by "jet blacking?"—the many cats who have raised big backs at seeing themselves in a polished boot, &c. &c. Now why is it that a boot becomes a mirror after it has received a coating of the "superlative" blacking? Because the pores and irregularities of the leather are filled up with a species of varnish, and reduced to a tolerably level and smooth surface, so that the light which is reflected from the leather approaches in some degree to the regularity of that reflected from a looking-glass. The same is true of a polished tea-tray, and articles of a similar kind. The material of which they are formed is not in itself possessed of such a smooth surface as to afford a reflection of the face; but by covering it with a species of japan, the irregularities are filled up, and a smooth surface obtained. Japans, varnishes, French polishes, and everything of that description, act on this principle.

Now this is the reason why a piece of plate-glass is so valuable as the material to which the mercury is attached. Not only is it as transparent as any solid substance hitherto known, but it possesses a surface so exquisitely smooth, that the manufacturing arts can scarcely produce a parallel instance to it. What we call *ground* glass is glass which has had one side roughened by a species of grinding: nothing has been added to, or subtracted from, the materials of the glass itself; its nature has not been changed, but its surface, by being roughened, prevents light from passing freely through; and if one side of such glass were to be silvered, we should find that it would utterly fail us as a looking-glass; it would afford no image of the face, not even so good as from a piece of blackened glass.

Everybody prefers "plate" glass to "common" glass, as a dressing-glass, because the latter presents the spectator with a reflection anything but like the original. A Grecian nose may become a pug,—an arched eye-brow may become marvellously crooked,—an oval visage may become as squat as that of Sancho Panza. Now this is no fault in the substance of the glass itself; it results merely from the circumstance that the surfaces of the glass are not *flat*. The light passes through the glass as easily as through plate glass, but from the crookedness of the surfaces it is bent and distorted out of its proper directions.

On some occasions the toilette is provided with concave and convex looking-glasses, as well as the usual flat ones. The convex have the property of diminishing the size of the reflected object, and the concave that of magnifying it; whereas, the flat, or plane glasses, yield an image the same size as the original would appear if it were behind the glass, and the glass transparent. The action of the convex and concave mirrors is dependent on certain well-defined laws of optics, but which are rather too intricate to engage our attention here. The light penetrates through the substance of the glass, and is reflected from a coating of mercury on the back.

If a piece of stained glass were used as a looking-glass,—by having a coating of mercury on one side, it would present an image of the face the same as with colourless glass; but it would be tinged with the colour with which the glass is stained: and would not appear so brilliant, because much of the light is absorbed by the glass, or by the material with which it has been stained.

Having thus treated of the philosophy of the *action* of a looking-glass, we must in another article speak of the philosophy of its *manufacture*, and of the source of that remarkable metal, mercury, with which one of its surfaces is coated, and by whose means it is enabled to act as a looking-glass.

LOCUSTS.

Mr. Madox, in his recent travels through Egypt, says,—"April 8th, an immense host of locusts showed itself, during the last three or four days, apparently coming from the east. The number of these insects absolutely obscured the atmosphere, which otherwise was clear and serene; though the vibratory motion of their wings in the brilliant sunshine had a peculiar and rather pleasing effect. They flew heavily, and frequently struck against the houses, and falling on the ground, the fowls and dogs devoured them with much avidity, particularly the latter, who ate them so voraciously that they made themselves sick. These locusts were of the form and size of large grasshoppers, and many alighted on the neighbouring grounds to deposit their eggs upon the verdure. The governor, however, most providentially sent people to collect and destroy them, which was effected by burying them deep in the ground, or by burning them in heaps. I afterwards saw innumerable swarms of these insects floating on the sea, and covering the whole line of coast."

M. Arago, the French philosopher, has advanced the opinion, that the climate of France is gradually becoming colder. He supposes the advance of the north polar ice towards the temperate zones, to be the cause. Sir John Barrow advanced a similar notion concerning the climate of England many years ago.

RISE AND PROGRESS OF THE SILK MANUFACTURE.

No. II.

MULBERRY-TREES;—THE SILK-WORM.

THERE are different species. It is hardy, of quick growth, and easily naturalized in all climates. The black species has always been cultivated for its fruit in Europe: the white sort comes from India, whence it has been introduced into all the western countries which have attempted the culture of silk. The respective qualities of each species, as connected with the silk-worm, cannot be better pointed out than by observing, that if leaves of the white, next the red, and lastly the black, be given at the same time, to the insect, it will eat first the white, next the red, and lastly the black. The white came originally from China, and would appear to be its most natural food.

It is said that no insect, excepting the silk-worm, will feed on the mulberry-leaf. Other fruit-trees in the same garden were sometimes covered by myriads of insects, while the mulberry tree, surrounded by these ravagers, remained sacred from their depredations.

The silk-worm, or bombyx, is a species of caterpillar, which, like all other insects of the same class, undergoes a variety of changes, during the short period of its life; assuming in each of the three successive transformations, a form wholly dissimilar to that with which it was previously invested. Silk-worms proceed from eggs which are deposited during the summer by a grayish kind of moth. These eggs are of the size of a grain of mustard-seed, of a yellow colour. When first hatched, it appears as a small black worm, about a quarter of an inch long. Its first indication of life is the desire which it evinces for obtaining food, and if not immediately supplied, it will exhibit more power of locomotion than characterizes it at any other period. So small is the desire for change, on the part of these insects, that it may generally be said, their own spontaneous will seldom leads them to travel more than three feet throughout the whole duration of their lives. In about eight days from its being hatched, its head becomes perceptibly larger, and the worm is attacked by its first sickness. This lasts three days, during which time it refuses food, and remains motionless in a kind of lethargy. At the end of the third day from its refusal to eat food, the animal appears much wasted in its bodily frame, a circumstance which materially assists in the painful operation of casting its skin.

The first effort is to break through the skin nearest to the head, which, as it is the smallest there, calls for the greatest exertion; and no sooner is this accomplished, and the two front legs disengaged, than the remainder of the body is quickly drawn forth. This moulting is so complete, that not only is the whole covering of the body cast off, but that of the feet, of the entire skull, and even the jaws, including the teeth. These several parts may be discerned by the unassisted eye, but become very apparent through a magnifying lens of moderate power. In two or three minutes the worm is wholly freed, and again puts on the appearance of health and vigour, feeding with recruited appetite upon its leafy banquet, and continuing to feed during five days. At this time its length will increase to half an inch, and then it is attacked with its second sickness, followed by a second moulting, similar to the first. Its appetite then returns, and is indulged during other five days. Increasing to three-quarters of an inch, it then undergoes its third sickness and moulting. These being past in all respects like the former, and five more days of feeding having followed, it is seized with its fourth sickness, and casts its skin for the last time in the caterpillar state.

The worm is now one and a half to two inches long: this last change completed, the silk-worm devours its food most voraciously, and increases rapidly during ten days, attaining its full growth, from two and a half to three inches long. When the worm has fixed upon some angle or hollow place whose dimensions agree with the size of the intended silken ball or cocoon, it begins its labour by spinning thin and irregular threads, which are intended to support its future dwelling. During the first day the insect forms upon these a loose structure, of an oval shape, which is called floss-silk: and within which covering, in the three following days, it forms the firm and consistent yellow ball,—the labourer of course, always remaining inside the sphere which it is forming. The silky material, when drawn out, appears to be one thread, but is composed of two fibres, twisted together. The worm, when spinning, rests on its lower extremities throughout the operation, and employs its mouth and front legs in the task of directing and fastening the thread.

At the end of three or four days, the worm will have completed its task, and formed its cocoon. When done spinning, it smears the entire internal surface of the cocoon with a peculiar kind of gum, very similar to the matter that forms the silk, designed to protect the chrysalis from rain and varieties of weather. This gum performs its office so well, that when, for the purpose of reeling the silk with greater facility, the balls are thrown into basins of hot water, they swim on the top of it, with all the buoyancy of bladders, nor does the water penetrate until the silk is nearly all unwound.

The insect now throws off its caterpillar state, and if the cocoon is opened, the inhabitant will appear as a chrysalis, in shape somewhat resembling a kidney-bean, pointed at one end, having a smooth brown skin; its former covering, so dissimilar to the one now assumed, lying beside. The silk-worm remains in the form of a chrysalis, for periods, which, according to the climate or the temperature wherein it may be placed, vary from fifteen to thirty days. It then throws off the shroud which had confined it in its seeming lifelessness, and appears as a large moth, of a grayish white colour, furnished with four wings, two eyes, and two black horns, or antlers. If left until this period within the cocoon, the moth takes immediate measures for its extrication; loosening the gum with which it had lined the interior surface of its dwelling, pushing aside the filaments, and making a passage for itself into light and freedom.

The moth enjoys its liberty for only a very brief space. Its first employment is to seek its mate, after which the female deposits her eggs, producing from 250 to 400, and both, in the course of two or three days, end their being. One hundred cocoons weigh one pound, and 1090 will yield one pound of reeled silk. Each cocoon therefore furnishes nearly eight and a half grains of silk, and the length of its thread is very nearly 1300 yards, or about three quarters of a mile long. A woman experienced in reeling may, with the assistance of a girl to turn the wheel, wind off with ease one pound of raw silk, of the most perfect quality, in one day.

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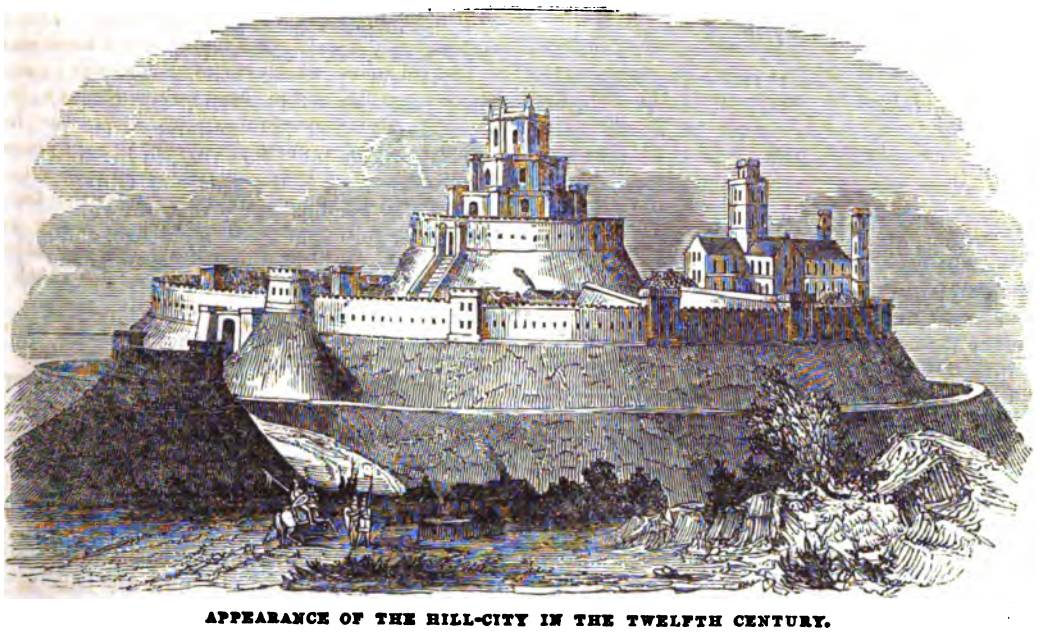
OLD SARUM.



APPEARANCE OF THE HILL-CITY IN THE TWELFTH CENTURY.

There is a temple in ruin stands,
Fashioned by long-forgotten hands;
Two or three columns, and many a stone,
Marble and granite, with grass o'ergro wn
Out upon time! It will leave no more
Of the things to come than the things before!
Out upon time! who for ever will leave
But enough of the past, for the future to grieve
O'er that which hath been, and o'er that which must be:
What we have seen our sons shall see—
Remnants of things that have passed away,
Fragments of stone reared by creatures of clay.

The aspect of Old Sarum tends to remind the visitant, with the eloquence of silent nature, of the mutability of human things. The lonely mounds now covered with green turf, and in some places indented with the ploughshare, were once the supports of walls, gates, towers, and a busy population military and ecclesiastical. But, while the works of man have perished, those of Nature remain. The "everlasting hills" abide, as the sacred historian tells us. They abide for, at least, their appointed time. The immediate works of God, though He has been pleased to make them finite, are more durable than the immediate works of man. The hills of Old Sarum remain, probably, as they stood thousands of years ago; but the human incumbrances of those hills have passed away for ever.

The site of Old Sarum is one mile north of New Sarum, or Salisbury, which is the chief town of Wiltshire, and is eighty-two miles from London. It strikes the most careless observer that, in the ancient mode of warfare, the elevated situation of Old Sarum, which commands a view of all the surrounding country, must have been an especial object of interest to the successive occupants of the southern part of our isle. We accordingly find that this place was, in turns, in the hands of *six* different nations; and that the possession of it was necessary to their safe occupancy of the soil. These nations, of whom we read in early English history, are the Ancient Britons, the Belgæ, the Romans, the Saxons, the Danes, and the Normans.

The earliest inhabitants of Great Britain are called the Ancient Britons; and by these we mean, those who occupied the country long before the arrival of the Romans. The word Sarum is peculiar to Latin speech, and is considered to have been so altered from *Saron*, more properly written Sar-on, which implies the *Hill of the Sun*. The hill of Old Sarum was, therefore, used both as a fortification and as a temple dedicated to the sun; and the priests, the ancient Druids, were called *Saronides*, or *children of the hill of the Sun*. The term *Druids* is derived from the Greek for an *oak;* and the hills where the ancient oaks grew, were particularly venerated by the Druids. On such hills they raised circular temples, for the celebration of their worship, similar to that which goes under the name of Stonehenge*, which is about six miles distant from Old Sarum. The old Britons, before Cæsar's time, had twenty-eight fortresses, of which Old Sarum was one.

The Belgæ were the inhabitants of the upper part of ancient France, called *Gallia*, or Gaul. It appears that many of them passed over the channel, and settled in the southern part of Britain; which being subdued, the hill of Sarum likewise fell into their power, and confirmed them in the occupancy of the country. The Belgæ were, in all probability, of the same stamp with the ancient Britons in respect of

* This curious and imposing structure, of which an account may be found in Vol. I., p. 185, of the *Saturday Magazine*, is supposed to have served not only for the public worship of the Druids, but for marking out the course of the *sun* in the seasons.

dress, language, religion, and manners. Their being located, therefore, in the counties of Wilts and Hants, could scarcely be called an intrusion.

The fortress of Old Sarum was occupied by a Roman garrison in the time of Vespasian, emperor of Rome, about A.D. 70, who conquered the Belgæ and other warlike tribes. In the military road-books of the Romans, this place is called *Sorbiodunum;* and it was one of the ten British cities admitted to the privileges of the Latian law. Owing to its central situation, and the different military ways, which converge on this point from the neighbouring stations, it must have been retained by the Romans till their retreat from our island.

The same reason which made Old Sarum important to the Romans, rendered it valuable to the Saxons. It was doubtless an object of early acquisition to these people, when they settled in the island. A battle took place, we are told, in the neighbourhood of OLD CASTLE, in the year 553, between the Saxons and the Britons, in which the latter were defeated. In 821, Egbert came to this place to fight with the king of Mercia, who was advancing from Wilton, which is about three miles from Old Sarum.

When the Danes, as we read, defeated King Alfred near Wilton, they dismantled Old Sarum, for fear of its serving for a refuge for the discomfited Saxons: but, as soon as the Danes had been expelled, it was the earliest care of Alfred to restore the military strength and security of this valuable post. At the end of the tenth century, Edmund Ironside was here besieged in vain by Canute the Great. So important did this town become in process of time, that the chief councils of the nation were wont to be held in it. About the year 960, King Edgar convened hither a parliament to consider how to provide for the safety of Northumberland against the incursions of the Danes. In 1003, Sweyn, king of Denmark, took Old Castle, pillaged, and burnt it, and returned to his ships with great wealth.

By the time that the Normans had established their dominions in England, the castle and city of Old Sarum had attained a high degree of importance and celebrity; so much so, that in the reigns of the first two Williams and Henry the First, the supreme assemblies of the kingdom sat at Sarum: and when William the Conqueror, by the authority of a synod, made an order, A.D. 1076, that bishops' sees should be removed from obscure villages to the best cities in each diocese, the see was removed from Sherborne to Old Sarum, by Bishop Herman, who laid the foundation of a cathedral, but died before he had finished it. Osmund, his successor, was sedulous in completing the work, and at length dedicated the church, A.D. 1092, to St. Mary, Holy-rood. It was taken, at the time, as an omen of the short duration of the church, that the steeple was, the next day after the dedication, struck and destroyed by lightning. Roger, who was advanced to this see in 1107, raised Old Sarum to an enviable degree of strength and splendour. The buildings were spacious, and their appearance beautiful. The same bishop likewise particularly adorned the church of Sarum, and added so many decorations to it, that it yielded to none, and even excelled most religious structures in England. The munificence and zeal of Bishop Roger, which in calmer times would have procured him the title of benefactor, had now a contrary effect: his fortifying and embellishing the castles of Sherborne, Devizes, and Sarum, was interpreted by King Stephen, as a traitorous proceeding, with a view to form places of refuge and protection to the empress Maud's party, his rival in the throne. On this pretence, the king seized on his possessions and castles; and being jealous of the ambitious designs of the clergy, and resolved to curb their exorbitant power, he deprived them of their places of strength, and conferred them on laymen, in whose allegiance he could more securely confide. Sarum thus fell to the government of Patrick Devereux, son to Walter, earl of Rosmar in Normandy, in the year 1139, at the decease of Bishop Roger; and it seems not to have come again under episcopal government. This was looked upon as a violation of the liberties of the church, and seems to have been the origin of the frequent disputes between the clergy and their military inmates. The next governor, or Earl of Sarum, was William Longue-épée, or *Long sword,* son of Fair Rosamund, who inherited Old Sarum by marrying the Countess of Salisbury. Of this pair a romantic tale is told; how that, in her lord's absence, she was confined in the towers of Old Sarum by the kinsman of her husband; that the valiant Longue-épée, a warrior of the Holy Sepulchre, and a champion of the Cross, held captive by the Saracens, and supposed to have perished in the Holy Land, in the disguise of a pilgrim, gained admittance at even-tide within the gates, overcame the oppressor, and recovered his beloved and faithful countess.

It appears, therefore, that the gradually increasing importance of Old Sarum, during a space of more than one thousand years, caused it to be fixed upon as the seat of episcopal government for this part of the island: but this addition to its importance, at the end of the eleventh century, was, in fact, but the commencement of its decay. Two rival governing powers were at work in the same place, the military and the ecclesiastical. At the end of the twelfth century, or about one hundred years after the translation of the see from Sherborne to Sarum, the evils resulting from dubious authority were growing apace. The nobleman who was the military governor of the castle, could not, we are told, bear an equal, nor the bishop a rival in power. Hence the adherents of the two contending authorities naturally took part in the quarrels of their superiors. The violence of the former prevailed in its day; but the influence of the latter superseded the former in its season.

Some writers say that want of water on the old hill was the cause of the removal of the town to a more commodious site: but this objection, if it had applied to the full extent, must, we should think, have operated from time immemorial, and does not seem to have been urged till the last. "Yet wer ther manny welles of swete water," says Leland in his *Itinerary;* and the river Avon ran by, within half a mile to the west. Again, it is said that the roaring of the winds was such, as to disturb the due discharge of divine service: but the impelling motive to a removal to the vale southward, was the disagreements between the military and clergy of the old town. Peter Blessen, archdeacon of London in the year 1160, exhorted the clergy of Old Sarum to remove their cathedral to the vale, in these words: "Old Sarum is a place exposed to the wind, barren, dry, and solitary: a tower is there, as in Siloam, by which the inhabitants have for a long time been enslaved. The church of Sarum is a captive on a hill; let us, therefore, in God's name, go down into the level, where the vallies will yield plenty of corn, and the champain fields are of a rich soil." This exhortation was responded to about sixty years after; when, a papal bull having been procured in the year 1219, a new wooden chapel was begun at New Sarum in honour of the blessed Virgin; and in a short time the work was so far advanced, that in the feast of

Trinity, A.D. 1225, the bishop, Richard Poor, celebrated divine service in it, and there consecrated a cemetery. From this time Old Sarum began to dwindle away. The people gradually followed the church, and descended into the vale, taking with them all their effects, even to the stones wherewith their houses were built. Many of the stones of which the Close-wall of Salisbury is now composed, are said to have once belonged to the cathedral and other principal buildings of Old Sarum. In the course of time New Sarum received a charter with many privileges, which tended to cause Wilton to decay, and Old Sarum to cease to be desirable to live in.

Though the lawlessness and violence of the military retainers of Old Sarum were well known, and felt not only by the clergy, but also by the citizens of the old city; yet we are told that the insults and ill-will of the soldiery towards the priests arose, in great measure, from the lewd and wicked lives of the latter, —in whom lewdness and wickedness were the more heinous, as being more especially God's servants upon earth, to make known the way of righteousness to mankind. Without regarding scandalous songs and ditties, which have come down from those times to the present, we may merely observe, by referring to the temperate page of history, that the Roman Catholic clergy of those, the middle ages, were, for the most part, anything but patterns of faithful ministers of their Divine Master.

The elevations of Old Sarum comprise three rings, nearly concentric. Without the outer ring to the south, was the town for the ordinary inhabitants. This outer ring is a mile and a half in circuit, and between the outer and second rings is a deep ditch. The second ring is vastly higher up, and forms a level circular space for the soldiers to abide and exercise, with watch-towers and barracks for their residence; and on the opposite, or north side, of this ring, stood the cathedral and the dwellings of the clergy. As the circuit of this ring is not more than five thousand feet, it is scarcely matter of surprise that the soldiers and the clergy, confined within this space, should disagree. Between this and the first ring was another ditch; and the first ring, which is higher than all, enclosed the castle, as shown in the frontispiece.

The castle of Old Sarum, and the surrounding domain, have passed through various hands in the lapse of ages. In the manor-house of the domain was born Pitt, Earl of Chatham, in whose family this property remained for about one hundred years, when it was sold for an immense sum of money, in the year 1790. The last remaining privilege possessed by this place, was the sending of two members to Parliament, who were elected by the holders of lands adjacent to the castle. This privilege was taken away by the Reform Act in 1832.

The Summer of 1834 being very dry, and that part of the second ring, where the old cathedral once stood, being laid down in grass, which had become parched with the heats of Summer, the traces of the foundations of the old cathedral, which was demolished in 1332, were distinctly visible for several weeks, and the ground-plan of the church was easily marked out. Several stone sepulchres were also laid open, the traces of which had likewise appeared above ground. It is to be remarked that these traces are to be observed only in particular years, when grass occupies the soil; for, generally speaking, the second ring is under the dominion of the plough. In the Close of New Sarum, or Salisbury, which is now laid down in grass, and which formerly served as a churchyard to the cathedral, the traces of ancient stone sepulchres, now not existing, are visible in dry weather. Many old Roman coins, and other vestiges of days gone by, have been turned up by the plough at Old Sarum. In a word, the contentions of man, and the silent hand of time, have, with the exception of a score or two of stones, which still linger on the upper rings of the departed city, brought it to pass that not one stone remaineth upon another. "How doth the city sit solitary that was full of people!"

"The earth-works of the Britons," as these mounds, partly natural and partly artificial, have been called, serve as pleasing walks for health and meditation. To the contemplative mind enough of its former glory still remains to tempt the lover of antiquity to wander round Old Sarum, and to conjure up in fancy its walls and gates of olden time, and its occupants royal and noble, sheathed in brass or steel; departed spirits gliding round the eternal ramparts, and sighing over their loneliness and desolation.

THE DUKE OF WELLINGTON'S WATERLOO CHARGER.

His colour was chesnut; and it is a saying founded on experience, that a chesnut horse is always a good one, and will do more work than any horse of the same size of any other colour.

The horse Wellington rode at the Battle of Waterloo for fifteen hours without dismounting, was a small chesnut horse. This was the "thorough-bred red chesnut charger" mentioned by Sir George Head when he relates an anecdote of the Duke of Wellington and Sir Thomas Picton, who, contrary to the duke's intentions, seemed at that moment likely to bring on an engagement, not long after the battle of Orthez. Having learnt where Sir Thomas was, the duke set spurs to his horse; the horse "tossed up its head with a snort and impetuously sprang forward at full speed, and in a few minutes *ventra à terre*, transported its gallant rider, his white cloak streaming in the breeze, to the identical copse distant about half a mile from whence the firing of the skirmishers proceeded. As horse and rider furiously careered towards the spot, I fancied," says Sir George, "I perceived by the motion of the animal's tail, a type, through the medium of the spur, of the quickened energies of the noble commander, on the moment when for the first time he caught view of Picton." This famous horse, named Copenhagen, because he was foaled about the time of the expedition against that city, died on the 12th of February, 1838, at Strathfieldsaye, of old age; there, where he passed the last ten years of his life in perfect freedom, he was buried, and by the duke's orders a salute was fired over his grave. The duchess used to wear a bracelet made of his hair. Would that I had some of thine in a broche, O Nobs! Copenhagen has been wrongly described in a newspaper as slightly made. A jockey hearing this said of a horse, would say, *Aye, a thready thing;* but Copenhagen was a large horse in a small compass, as compact a thorough-bred horse as ever run a race, which he had done before he was bought and sold to the duke in Spain. "He was a sweet, gentle creature," says a right good old friend of mine, "as I ever patted, and he came of a gentle race, by the mother's side; she was Meteora, daughter of Meteor, and a good trait in her master's character, Westminster's Marquis, was that his eyes dropped tears when they told him she had won a race, but being over-weighted she had been much flogged." He was worthy, like the horses of the Greek Patriarch Theophylact, to have been fed with pistachios, dates, dried grapes, and figs steeped in the finest wines,—that is to say, if he would have preferred this diet to good oats, clean hay, and sometimes, in case of extraordinay exertion, an allowance of bread soaked in ale."—*The Doctor.*

ANIMATED BEINGS.

Probably, there are five hundred species of quadrupeds on the globe, and every species contains, perhaps, many millions of individuals; certainly it is so of some. For example, of birds, it is thought there are four thousand species: of fishes, two thousand five hundred; of reptiles, seven hundred; and forty-four thousand different kinds of insects, beside many thousands of species altogether invisible to the eye. Who can say, and be rational, this vast variety of animated beings were the result of chance.

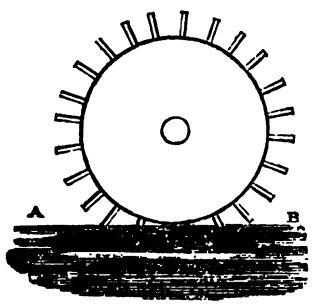
A WATER-WHEEL.

A WHEEL turned by the flow of water, and made to communicate motion to machinery for the purposes of grinding corn, &c., is a simple but admirable invention of ancient date. In the Greek anthology we find an epigram, which seems to indicate that water-mills were first invented in the time of Augustus; but Vitruvius, who flourished under this prince, does not in his book of "descriptions," speak of water-wheels as a recent invention; it is, therefore, probable that they were known long before his time.

A water-wheel is an instrument, which is turned round by the percussion of water, the wheel being allowed rotatory, but not progressive, motion; while the water, which is the moving force, has a constantly progressive motion. In strictness, the paddle-wheels of steamers are water-wheels; but are not described as such, because the action is different, the water being employed as a stationary resisting force.

The most useful forms of water-wheels are three; namely, the *undershot*, the *overshot*, and the *breast*-wheel.

The undershot wheel is by far the most ancient, and is usually employed in rivers and streams where the current is sufficiently rapid to *shoot under* the wheel, with a force capable of turning it round by acting on floats attached to its circumference: as in the figure, where the stream is supposed to be flowing from A towards B. In this case the wheel will evidently be turned round by the *momentum* of the water, the *weight* of which contributes scarcely anything to the effect: this form of wheel, therefore, is only applicable where abundance of moving water can be readily obtained. The undershot wheel also works equally well, whether the water act on one or the other side of its float-boards; so that a great advantage is gained in tidal rivers, where the direction of the current is reversed at ebb and flood.



The overshot wheel, or that form in which the water *shoots over* the wheel, may be understood from the drawing at the head of the present article. This form of wheel affords the greatest power with the least expense of water. It requires a fall in the stream equal to rather more than its own diameter: therefore this wheel is usually made larger, in proportion to its diameter, than other water-wheels.

In the construction of this wheel, a hollow cylinder or drum is first prepared, and suspended on a proper central axis. A number of buckets, or cells, are then fixed round the outside of this cylinder, extending from one end of it to the other. The water is conveyed by means of a trough of the same width as the wheel over its top, and is thence discharged into the cells placed round the wheel. In consequence of the form of these cells, the water is retained in them until their weight bears down the wheel on one side, and brings all the buckets in succession into an inverted position, when their contents are discharged into what is called the *tail-stream*. The buckets on the opposite side of the wheel ascend, with their mouths empty, until they get under the end of the water-trough to be re-filled. The flow of water from this trough is regulated by a hatch or sluice; and the object of this is to prevent a too rapid flow into the buckets, the effect of which would be to splash the water out of them instead of filling them. The thickness of the stream of water running upon the wheel, is in general not more than half an inch, or an inch, and with proper precautions scarcely a drop of water is ineffectually used.

It will be understood, therefore, that the overshot wheel acts by the weight of water contained in the cells or buckets, occupying nearly one-third of its circumference at any given moment; and it appears from Smeaton's experiments, that the dimensions, quantity of water, and height of fall, being the same, the overshot wheel will produce double the effect of the undershot.

We need not enter into any particular description of the *breast* wheel, since it partakes of the properties both of the under and overshot wheels. Its float-boards consist of two portions meeting at an angle, so as to approach the nature of buckets: hence, it is worked both by the weight of the water and by its impulse. The water which passes neither over, nor precisely under, the wheel, but, as it were, *abreast* of it, is in some measure confined by means of a bricked and arching channel which follows the curve of the wheel; so that the water, which enters at a point nearly level with the axis of the wheel, cannot escape without producing its full effect.

There are many points connected with the practical working of water-wheels, about which mechanical philosophers are not agreed; these we need not enter into; we will therefore close this short account of water-wheels with an illustration of their general action.

Suppose that an undershot wheel be set in motion by a stream which moves at the rate of three miles an hour, and that, while the wheel is at rest, the force of the stream against its floats is equal to eighty pounds; that the resistance of the machinery to be set in motion by the wheel (stones for grinding corn, for example,) is equal to one thousand pounds, and that this force exactly balances the pressure of the stream upon the wheel when at rest. It is obvious in this case that the wheel cannot move at all.

If the resistance of the mill-stones to the motion of the wheel be less than one thousand pounds, it by no means follows that the wheel will overcome such resistance: because, as soon as the wheel begins to move with the stream, it is no longer acted on by so great a force as when it was at rest. For if the wheel, unconnected with any other machinery, moved with the stream, its motion would be neither quickened nor retarded by the action of the water, but it would simply turn round at the same rate. If, however, the stream move with a velocity of three miles an hour, and the wheel with that of one mile an hour,

e of the water on the wheel will be equal
ty-five pounds; for we have already sup-
pressure to be equal to eighty pounds
'heel is at rest. If the wheel move at the
miles an hour, such pressure would be
ıird of the eighty pounds, that is, equal to
ty-five pounds.
has been found by experiment that an
wheel does most work, when its motion is
hird the velocity of the stream: that is,
supposed above, at the rate of one mile an
it is then capable of overcoming a resist-
to four-ninths of the weight which would
pressure of the stream upon the wheel at
we have supposed to be one thousand
that the work constantly performed would
about 445 pounds.
ıse of overshot wheels it has been found
locity of three feet in a second is generally
and all other parts of the work being
apted thereto, this will produce very nearly
t possible effect.

THE BIRD-MESSENGER.

.tion never conceived a more exquisite picture of beauty,
e of the ark gliding towards Ararat with the olive-
:he still, solitary, measureless surface of the waters,
pon its own shadow, and listening to the music made
gs."—*Anon.*

her, oh! whither, Dove?
ly pinion through the trackless air
ugh sunlit skies above,
ou in joyous flight alone repair?

re is the summer strand
uits thy coming, with its leafy bowers
re is the fragrant land
en sunshine and of smiling flowers?

re is the happy grove,
g loved home, the nestlings of thy breast-
l on thy flight, thou dove!
n the journey to thy promised rest.

ard, yet onward roam;
thy snow plumage to the warming sky;
may the voice of home
he long wanderer with a welcome cry.

rain, oh! vain that thought;
ıere ruin's blighting footsteps fall,
re death and doom were wrought,
ou canst seek thy home, thy mate, thine all?

where soundless waves
'er the glories of a world gone by?
where ocean laves
pride—his pomp—and all his misery?

, 'mid these marks of wo,
the peaceful bosom canst thou flee?
'st thou no dangerous foe,
ne bring aught of terror here to thee?

message fears no ill;
, the peace-branch gives assurance strong,
h joy my breast to fill,
ety—rest; then *who* can do me wrong?

ıe tempest hath gone down,
n-brought ruin hath fulfilled its hour.
kness and wo are flown;
ean's fury hath restored her power.

ıd hear, yet hear my voice,
hath been purchased; lo! the waves decrease:
k forth—believe—rejoice:
ny last whispers; welcome! welcome PEACE!"

I thy wings thou dove!
ne! with peaceful happy promise blest;
ı would I flee above,
ke thee seek to be at home—at rest.

Ireland. S. H.

ENGLAND IN THE OLDEN TIME.

No. V.

EXHIBITIONS OF TRAINED ANIMALS.

ONE of the most remarkable means by which men have displayed their patience and ingenuity, in order to get up public shows and exhibitions, is that of instructing animals to go through exercises, differing very much from those which belong to their natural habits.

What is the feeling that prompts men to run after exhibitions of this kind? Is it an admiration of the skill displayed by the animal, or that displayed by the owner in teaching the animal, or merely a love for the grotesque and marvellous let it be shown in what way it may? Whatever be the true source of the tendency, it is certain that it has been manifested in England from a very early period; for the manuscripts of the twelfth, thirteenth, and fourteenth centuries contain numerous representations of wonderful dogs, horses, pigs, goats, cocks, bears, monkeys, and quadrupeds of all sorts and sizes. We cannot but express our regret at the continuance of such a taste at the present day; for it shows that the spread of education has not yet banished so silly a curiosity as that which is directed towards the accomplishment of feats which, we know, could not have been taught to the animals, but at the expense, on their parts, of great pain and suffering. If the tamers or educators of the lions, tigers, monkeys, pigs, and fleas, with whose performances the Londoners are honoured, were very much more clever than those of bygone days, we might give them a sort of preference, though of a dubious kind; but it seems as if our ancestors possessed as great advantages as we do in this important matter, as the following details will show.

There is an illuminated MS. of the twelfth century, in which there is a representation of an Anglo-Saxon Gleemen's bear-dance. The principal joculator, or juggler, (for this was a common name given to the teachers of "wonderful" animals,) appears in the front, holding a knotted switch in one hand, and a line attached to a bear in the other: the animal is lying down in obedience to his command, and behind them are two more figures, the one playing upon two pipes or flageolets, and elevating his left leg, while he stands upon his right, supported by a staff that passes under his arm-pit; the other dancing in an attitude exceedingly ludicrous. This performance takes place upon an eminence resembling a stage, made with earth, and a concourse of people are standing round it in a semicircle, as spectators of the sport.

The representation at the head of this article is taken likewise from an early MS., and shows us not only the pipe and tabor of the joculator, and his dancing bear and dogs, but what is still more ludicrous, a cock on stilts. To subdue the proud spirit of a cock, and to force him to mount upon stilts, must have been a feat by no means behind those which astonish the admirers of such exhibitions at the present day.

Thomas Cartwright, in his *Admonition to Parliament against the use of the Common Prayer*, published in 1572, says, "If there be a bull or a bear to be baited in the afternoon, or a jackanapes to ride on horseback, the minister hurries the service over in a shameful manner, in order to be present at the show;" a complaint which, if true, shows happily a marvellous contrast to a Christian minister at the present day.

Monkeys have been at all times the favourite animals for these kind of exhibitions: perhaps it is that there is a certain degree of waggery about them which gives additional relish to the joy of the spectator. An ape leaping or tumbling over a chain or cord, held by the juggler, was a favourite trick at Bartholomew fair, so far back as the time of Ben Jonson, and in the induction or prologue to his comedy of *Bartholomew Fair*, written in 1614, it is said, "He, [meaning the author,] has ne're a sword and buckler man in his fayre; nor a juggler, with a well-educated ape to come over the chaine for the king of England, and back again for the prince, and sit still on his haunches for the pope and the king of Spaine." The mention of the names of these great personages is in allusion to a sort of "hocus-pocus," practised by the jugglers.

Horses have not been left behind in the endeavours of jugglers to teach animals to be unnatural. It is said that the people of Sybaris, a town in Calabria, were proverbial for their effeminacy, and that they taught their horses to dance to the music of the pipe; for which reason their enemies, the Crotonians, at a time when they were at war with them, brought a great number of fifers into the field, and at the commencement of the battle, they began to play upon their pipes. The Sybarian horses, hearing the sound of the music, began to dance; and their riders, unable to manage them as they ought to have done, were thrown into confusion, and defeated with prodigious slaughter.

But without going abroad, and without dwelling on a story which may or may not be true, there is mention made of a horse, exhibited by some joculators in England in the thirteenth century, who was taught to dance upon a rope; and oxen were rendered so docile as to ride upon horses, holding trumpets to their mouths, as though they were sounding them. In one old MS. is a representation of a horse dancing to the music of a pipe and tabor, which the joculator is playing before him: the horse is reared on his two hind legs, and is fantastically moving his fore-legs. In another instance the horse is represented as rearing up and attacking the joculator, who opposes him with a small shield and a cudgel. These mock combats, to which the animals were properly trained, were constantly regulated by some kind of musical intrument. Two other representations in ancient MSS. are still more remarkable. In one the horse is reared on his hind-feet, and is playing with his fore-feet upon a tabor held in the hand of the joculator. In the other, he is reared on his fore-feet, and playing on the tabor with his hind-feet.

Now the degree of instruction necessary to teach these exercises to horses, at least equals anything *which we meet with in* our own day. We find horses who are taught to lie down, to lick the rider's hand, to suffer a table-cloth, with provisions for dinner, &c., to be placed on his side, and a lot of other farcical tricks; but there is nothing in this more indicative of skill in the teacher than in the ancient instances which we have just adduced. The following is another instance; in the Harleian library is preserved a show-bill, published in the reign of queen Anne, to the following effect:—"To be seen, at the Ship, upon Great Tower Hill, the finest taught horse in the world. He fetches and carries like a spaniel-dog. If you hide a glove, a handkerchief, a door-key, a pewter spoon, or so small a thing as a silver twopence, he will seek about the room till he has found it, and then he will bring it to his master. He will also tell the number of spots on a card, and leap through a hoop; with a variety of other curious performances."

These feats with horses became very popular, and gradually found their way into theatres. A person named Price exhibited trained horses at Islington about eighty years ago. Then another man named Sampson took up the same line of occupation; and afterwards a third, the well-known Astley, in whose hands, and in those of his successors, such performances have been continued till the present day, on the Surrey side of Westminster bridge, at the Amphitheatre.

Dancing dogs have had likewise a fair share of this questionable species of education. At the beginning of the last century, a company of dancing-dogs appeared at Southwark fair. The announcement of the bill states that the "ball of little dogs" was well worthy of patronage; that "the dogs came from Louvain, and perform, by their cunning tricks, wonders in the world of dancing. You shall see one of them, named Marquis of Gaillerdain, whose dexterity is not to be compared. He dances with Madame Poucette his mistress, and the rest of their company at the sound of instruments, all of them observing so well the cadence, that they amaze every body." These dogs had the superlative honour of dancing before Queen Anne.

Even the little timid hare has been brought under requisition for exhibitions of this kind. There is a MS. more than four hundred years old, in which a hare is represented standing on her hind legs, holding a tabor in her right fore-paw, and a stick in the left, with which she beats the tabor, and no doubt "discoursed exquisite music." Pity that she could not play the pipe likewise! Ben Jonson describes a similar exhibition to this, as being prevalent at Bartholomew fair in his time.

Who has not heard of learned pigs, who are taught to pick up letters written upon pieces of card, and to arrange them in a certain order? The pig has the reputation of being an animal who is prone to do precisely that which his master wishes him not to do; but it seems as if training, and beating, and short commons, could reduce even him to obedience.

One of the most remarkable exhibitions of past years, is one that took place in the vicinity of Pall Mall, about half a century ago, and of which Strutt has given a description. A number of little birds, to the amount of twelve or fourteen, being taken from different cages, were placed upon a table in the presence of the spectator, and there they formed themselves into ranks, like a company of soldiers. Small cones of paper, bearing some resemblance to grenadiers' caps, were put upon their heads; and diminutive imitations of muskets, made with wood, were secured under their left wings. Thus equipped, they marched to and fro several times; after which a single bird was brought forward, supposed to be a deserter, and

set between six of the musketeers, three in a row, who conducted him from the top to the bottom of the table; in the middle of which, a small brass cannon, charged with a little gunpowder, had been previously placed, and the deserter was situated in the front part of the cannon: his guards then divided, three retiring on one side and three on the other, and he was left standing by himself. Another bird was immediately produced, and, a lighted match being put into one of his claws, he hopped boldly on the other to the tail of the cannon, and applying the match to the priming, discharged the piece, without the least appearance of fear or agitation. The moment the explosion took place, the deserter fell down, and lay apparently motionless, like a dead bird; but, at the command of his tutor, he rose again, and, the cages being brought, the feathered soldiers were stripped of their ornaments, and returned to their cages in perfect order.

We shall not extend these details further, although there are abundant proofs of the prevalence of the custom which we have been considering, scattered through works which treat on antiquarian subjects. Our object has been to illustrate one of the features of England in the Olden Time; but we have also wished to show, that whatever supposed merit may attach to the art of teaching poor animals to be unnatural, the moderns are not a whit in advance of our ancestors. We cannot but regret the existence of the silly gaping wonder, which fills the pockets of the trainers of goats, dogs, monkeys, and other animals, at the present day. That it is inconsistent with the proper dignity of man can hardly be doubted; and even any claim to attention, on the ground that the trainers of the present day exhibit more sagacity and cleverness than those of bygone days, must be dissipated by the details which we have here given, and which sufficiently show that former generations witnessed exhibitions fully as wonderful as those of our own day.

LUMINOUS APPEARANCE OF THE SEA.

I.

BY CAPT. J. P. COUTHOUY.

'THEY that go down to the sea in ships, and do business in the great waters, these see the works of the Lord, and his wonders in the deep.' To the truth of this remark of the Psalmist, every person who 'has gone down to the sea' can bear witness. That mighty and unfailing reservoir is in itself, for sublimity and grandeur, a spectacle to which the land has no parallel. Whether its vast expanse is spread out calm and mirror-like, undisturbed, save by the long and heavy swell whose undulations have not ceased, since at the word of their Creator, 'the waters were gathered together unto one place,' or broken up into liquid mountains by the breath of the fierce storm—it is alone in the severe majesty of its beauty,

Unchanged, unchangeable, the eternity of Earth.

But it is not for itself alone that the ocean is wonderful; wild and strange shapes people its depths and sweep over its surface. Glorious creatures replete with life and loveliness, beautiful in form, and in hue more manifold than the rainbow, sport in its recesses, and gladden the wide waste of waters by their presence. There the huge whale sluggishly heaves his mammoth form above the yielding element, marking his path by sheets of snowy foam, while 'out of his nostrils goeth smoke as out of a seething caldron.' Sullen and slow the shark glides past the fearful beholder, like a foul spirit unwillingly brought to the light of day; while the dolphin darts through the waves like a beam of molten gold, or the silver and azure flying-fish speeds like an arrow over their crests: and far down where 'the purple mullet and gold-fish rove,'—

There, with its waving blade of green,
The sea-flag streams through the silent water,
And the crimson leaf of the dulse is seen
To blush like a banner bathed in slaughter;
There, with a light and easy motion,
The fan-coral sweeps through the clear, deep sea;
And the yellow and scarlet tufts of ocean
Are bending like corn on the upland lea.

Among all the strange and wonderful sights however, which present themselves to the view of a stranger journeying over the ocean, there are perhaps none which excite greater surprise, or afford more pleasure, than the phenomenon which forms the subject of the present article. Who, that has witnessed this beautiful appearance, does not remember the inquiring wonder, the fanciful speculations, that arose in his mind, as he gazed for the first time upon the flood of light which streamed off from the sides of the vessel, interspersed with gems of living lustre in every hue and shade of brilliance? Now, flashing far down in the dark-blue water, like a gush of regal diamonds, now gleaming on the surface through the shadow of darkness, like the torch of a fairy. Who has not hastened with almost childish eagerness, to examine the minute and glittering particles thrown within his reach by the spray, and too often regretted the inability or indifference of those to whom he turned for information? And who, among the bravest, has not felt at least a momentary sensation of awe steal over, and his heart shrink within him, when, from one boundary of the wide horizon to the other, he has seen the ocean seemingly changed in its nature, and rolling, like the fabled Phlegethon of the ancients, in waves of liquid flame?

The solution of these singular phenomena has long excited the research of the philosopher, and attracted the attention of the voyager. Many theories have been started to account satisfactorily for their origin. Silberschlag believed that their nature was phosphoric. Professor J. Mayer supposed the light to be imbibed by, and subsequently evolved from, the surface of the sea. By Gentil it was conjectured to arise from the presence of the electric fluid, because it was occasionally produced by friction. Others attributed it to the putrefaction of marine animals and plants. It is unnecessary, at present, to examine the grounds for these opinions, as they are contradicted by all the later observations of naturalists. It is now generally conceded, that the luminous appearance of the ocean is attributable to the presence of innumerable small animals of a gelatinous substance, which emit their light by means of some secretion, the nature of which is, as yet, unknown. These animalculæ are mostly included under the generic term of *Medusæ*. Their form and size vary from the refulgent *Medusa pellucens*, or transparent medusa, which sometimes measures eight inches in diameter, to the sparkling *Nereis noctiluca*, or night-shining nereis, which is so minute as to be scarcely perceptible to the unassisted eye. The *Cancer fulgens*, or lightning-crab, a small species of shrimp, also possesses this property in a high degree.

The following, it is believed, are the principal varieties of luminous marine animals enumerated by naturalists:—*Medusa pellucens*, discovered by Sir Joseph Banks, during his passage from Madeira to Rio de Janeiro with Captain Cook, on his first voyage. *Medusa noctiluca*, described by Forskal, is of an hemispheric form, nearly three inches in diameter, semi-

transparent, of a reddish colour, with brown spots, the margin scalloped, and it has several broad tentacula depending from the interior. *Medusa densa*, also described by Forskal, seems rather to be a *Beroe*. *Medusa lucida*, which was discovered by Mr. Macartney, on the coast of England. His description states that it was about half an inch in diameter, the margin undivided, and surrounded on the inside by a row of pale brown spots, with numerous twisted feelers. Four dark lines crossed from the circumference to the centre, from which an irregularly shaped process hung down. When this was examined with a strong lens, it was found to be enclosed in a sheath, and that its extremity was covered with small cups or suckers, like those on the tentacula of the cuttle-fish. *Medusa scintillans*, first noticed by the same person, very small, transparent, and of a globular form; their motion slow and graceful, without any apparent contraction. *Medusa phosphorea*, found by Spallanzani in the Mediterranean, and from his description, similar to the *Medusa pellucens*. He represents it as extremely luminous, shining like a bright flame, and visible at the depth of six or seven fathoms. *Pyresoma atlanticum*, and *Beroe fulgens*, both found in the Atlantic ocean, and described hereafter. *Pennatula phosphorea*, commonly called the sea-pen, found in the Mediterranean. This animal's light is said, by Dr. Shaw, in his *History of Algiers*, to be so powerful, that the fishermen are directed by it in arranging their tackle. The luminous effect is confined to the feather of the pen, or that part which is inhabited by the polypus. Spallanzani affirms that it is only visible when the sea-pen is moving about. The *P. grisea*, *P. grandis*, and *P. argentea*, are also said to possess this quality. The *Pholas dactylus*, a bivalve shell-fish, found on the coasts which border the Mediterranean sea, is well known for its powers of evolving light. As long as eighteen hundred years ago, Pliny observed that every part of its body was filled with a fluid which, like phosphorus, illuminated everything on which it was rubbed. Réaumur confirms the above, and also noticed that the luminous property was communicated to water or any other liquid in which the animal was placed. *Limulus noctilucus*; this insect was found by Captain Horsburg, author of the East India Directory, in the Arabian Sea. He compares it, in appearance, to a wood-louse, and says it was covered by a thin shell, from beneath which protruded a number of antennæ, or horns, like minute bristles. *Cancer fulgens*, discovered by Sir Joseph Banks at the same time with the *M. pellucens*. He remarked that its whole body was frequently illuminated, and emitted very brilliant scintillations. *Cancer pulex*, sometimes denominated sea-louse. The fact of this insect giving light is doubted by some, but the French academicians, Thules and Bernard, assert that they met with it entirely luminous; and Hablitz, a German writer, states that on examination of a cable which sparkled on being drawn from the sea, he found it covered with the *Cancer pulex*. *Nereis noctiluca:* to the presence of this small creature the light of the sea has been very often ascribed, even by persons who never saw it. It is now, however, believed to be a rare species, at least in the northern seas. It was first described by Vianelli, in 1749. To the naked eye it appears of a yellowish colour, and about the size of an eye-lash. Under the microscope it exhibits many joints; the head has two short feelers, with a sort of horn between them. From the sides project a number of processes, transparent, and containing a bunch or tuft of hair, and on the under side are similar processes, resembling the feet of the caterpillar. The above, it is believed, are nearly all the marine animals which, it is well ascertained, are possessed of the faculty of exhibiting light. It will be seen that they are all of the simplest and lowest order of organization. It is not intended to give a full account of all these varieties, but merely to select a few of the most remarkable found in the northern seas, and mention some of the wonderful effects, which beings so minute are enabled by their great numbers to produce.

Perhaps in the whole tribe of luminous creatures, there are none more brilliant than the one designated by the discoverer, M. Peron, as the *Pyresoma atlanticum*. It is from one to three inches in length, of a cylindrical figure, one of its extremities of a conical form, and the other truncated. The body is hollow, and destitute of any organs, except a very delicate structure, resembling net-work, which lines the interior of the cavity. The exterior is covered with numerous small tubercles, which are the principal seat of the light, which is reflected in an almost incredible degree in the dark. At a small distance below the surface, the *Pyresoma* appears similar to a large ruby, giving out the same rich rosy tints for which that gem is remarkable. This creature is not unfrequently met with in clusters, of the size of a man's head, when the appearance is extremely beautiful, not unlike the globes frequently placed for show in the windows of druggists. On taking one of them from the water, and compressing it in the hand, a luminous, blueish white substance is effused, which remains but a few moments, and leaves the animal dead and lustreless.

Another of these beautiful creatures is the *Beroe fulgens*, or shining beroe, about an inch in length, and of various colours. In shape it is similar to the last mentioned, and its appearance in the water is much the same. It collects also in numbers, but instead of clusters, it is found in long chains. In some latitudes, they may be seen floating in myriads, of every hue and shade, from the deep green of the emerald, and the purple and violet of the amethyst, to the clear pellucid sparkle of the diamond. In a calm afternoon, near sunset, they may be observed lying in coils like snakes upon the water, or changing their form and position, with every undulation. It was from a knowledge of this circumstance, perhaps, that Coleridge derived the idea of the following beautiful description, in that wild and thrilling poem, *The Rime of the Ancient Marinere*.

> Beyond the shadow of the ship,
> I watched the water snakes;
> They moved in tracks of shining white,
> And when they reared, the elfish light
> Fell off in hoary flakes.
>
> Within the shadow of the ship,
> I watched their gay attire;
> Blue, glossy green, and velvet black,
> They coiled and swam, and every track
> Was a flash of golden fire.

It is, in reality, difficult for the spectator to believe that all these varied and brilliant appearances, are produced by the presence of an inert, and (except a sort of pulsation, caused by contraction and expansion) motionless jelly, which dissolves even while he is examining it. The two last-named species are found in great abundance from the Azores to the Cape de Verds, and perhaps, along the whole extent of coast, south of those islands.

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not necessarily accompany a comet. Many small comets have had immense tails, and many large and bright comets have had no tails. The variety is immense; for the flock of these celestial coursers seems very large, and even countless. Hundreds have been noticed in the records of the world: and, as these are the largest and brightest seen, it is presumed that many, which were small, escaped notice. Very many have been observed of late, and their number is deemed to be illimitable; for all, which are near the earth, are not always seen, owing to their being on that part of the heavens which is above the horizon during the day.

The comets of 1585, 1682, and 1763, had no tails. Indeed, the second of these three is described as being large, bright, and flaming, with an appearance like that of the planet Jupiter. But a comet is reported to have been seen in 1744, which had a tail made up of as many as six streams of light, all extending to the distance of 30° over the dome of the heavens.

Very little is known concerning the *nature* of comets: some have asserted that stars have been seen through the nucleus or head of a comet; this, however, is doubtful, as it is more probable that the light from the star is refracted through the surrounding atmosphere of the comet. It seems a more rational conjecture that the body of the comet is opaque; but that, when it approaches so near, as some of them do, to the Sun, all the substances which are vaporizable on its surface are converted into vapour, and form an immense atmosphere round it. This atmosphere, on account of the great velocity with which the comet moves, becomes left somewhat behind, and may, perhaps, furnish an origin for the coma, or the tail. Sir Isaac Newton supposed that the tail of a comet arose from a thin vapour elicited from the comet by the heat of the Sun. Another opinion is, that comets serve the purpose of bringing back to the planets of our system the electrical matter which they constantly throw off: it must be admitted, however, that all is pure conjecture on this point. It has been urged by those who advocate the hypothesis, that the body, or nucleus of the comet is opaque, that it exhibits phases similar to those of the Moon, when viewed in different directions; but this again is denied, for some comets have been watched, when about to cross over the disk of the Sun, and no spot was discoverable upon that luminary. The comet of 1680 approached so near to the Sun, that Newton estimated that it was exposed to a heat two thousand times greater than that of red-hot iron. Newton further conjectured that comets were bodies which gradually approached nearer to the Sun, and finally fell upon it, and might thus repair the waste supposed to occur from the continual emission of light and heat from the Sun. The discovery of the elliptical orbits of comets, however, deprives this hypothesis of much of its value.

But in order to come to some definite opinion about the nature, or substance, of this class of the heavenly host, we have to state that all comets, especially those of modern observation, present a vaporous sort of substance to terrestrial gaze. Their mass becomes denser towards the centre, which appears like a stellar point; and the light, whether encircling this point as a coma, or streaming from it as a tail, seems to have, as it were, the texture of the aurora borealis, and like the latter, to allow of the appearance of the stars through its filmy substance. The more prevalent opinion then, at present, respecting the nature of these beings, is that they are of a flimsy character, and that they are gradually absorbed by the Sun when they come into his neighbourhood; whence it is, that every remarkable comet, whose re-appearance has justified the expectations of mankind, has disappointed the crowds who have sought to gaze upon the strange visiter in the skies. Its spare and attenuated aspect has made us wonder what our forefathers of old saw to fear, and to be astonished at: for if astronomers had not told us when and where to look for them, we should not be aware of their presence.

Comets have great variations in size during the time they are visible. Sometimes they appear as faint objects in the distance, but enlarge by degrees, and throw out a tail, and so increase in brightness and extent till they become lost in the light of the Sun. If, during the time of the comet's *doubling* the Sun (so to speak), it lose any of its substance, it seems usually to gain in brightness; the sun-beams seem then most chiefly to promote the splendour of the tail, until the comet, having receded far away from the Sun, disappears like a spirit of ether.

In speaking of the orbits of the various planets, we always refer them to the Earth's orbit as a standard by which their directions in the heavens can be understood; and we say that an orbit is inclined a certain number of degrees to the ecliptic, or Earth's orbit, according as the two orbits deviate much or little from coincidence with each other. Now it so happens that the orbits of all the planets deviate but a very few degrees from each other, while the orbits of the various comets which have been observed deviate from the direction of the Earth's orbit by angles of almost every amount. A right angle is the largest angle that can exist between two lines or two planes, and it is found that the orbits of the comets form almost every kind of angle with the ecliptic from 0 degree (or coincidence) to 90 degrees, or a right angle: this then is one circumstance in which comets differ greatly from the planets. Another point of difference is the *form* of their orbits; the orbits of the planets are in reality elliptical, but the ellipticity, or the eccentricity,—that is, the amount of difference between the circular and the elliptic form,—is so small, that the planetary orbits differ but very little from circles. Such, however, is not the case with the orbits of the comets; they are for the most part exceedingly long, or very eccentric, ellipses,—indeed, it was for a long time doubted whether their paths were ellipses at all, or whether they were real orbits. This we must explain. There are two curved lines called parabolas and hyperbolas, to which we may obtain a rude resemblance by considering a bee-hive turned upside down; they terminate at two ends, and do not meet again at any point so as to form an orbit. Now it is susceptible of proof, that, if two of the heavenly bodies were situated in space, and acted on each other by the attraction of gravitation, one of them might have such a velocity and direction of motion given to it, as would make it describe a circle round the other body; or that, by altering the direction and velocity, the body might be made to describe either an ellipse, a parabola, or a hyperbola: in the latter two of which cases, it would never return again to the spot from whence it set out, but would continue travelling on through space for ever, unless acted on by some of the bodies in or near its path.

The question of the orbital motions of comets is referrible to that part of mathematics which is termed the "Conic Sections." The figures obtained by these sections, or divisions, of a cone, are five. If we take a cone, usually compared for shape to a sugar-loaf with a sharp top, and divide it by a line parallel with the base, the figure obtained by this division is a *circle*. If we divide it from the top vertically downwards, the figure is a *triangle*. These two figures are, however, not taken into account in this department of science, but belong to common geometry. The third section is an *ellipse*, made by cutting the cone from side to side obliquely into two parts. The fourth figure is a *parabola*, made by dividing the cone in a direction parallel with one of its sides: and the fifth figure is the *hyperbola*, made by dividing the cone in a direction parallel with its axis, which is a line descending from the vertex, or top, to the centre of the base.

But there were also circumstances, which rendered untenable the opinion, that all comets moved either in parabolic or hyperbolic orbits. Comets appeared after certain intervals, which presented exactly the same features, as to shape, position, and distance from the sun, as some which had preceded them; and, by certain calculations, it was proved that a comet, moving with the same velocity as an observed comet, would perform a certain revolution in a certain time, and that time was found to correspond with the interval between the appearances of the same comet: this combined process of calculation and observation, was applied to several comets, and the result being successful upon certain occasions, it is now considered as proved that some comets move in elliptical orbits about the sun. When, therefore, we say, that the comet, which was visible in 1835, was the same which Halley saw a century and a half ago, we mean, that a calculation, founded on the observed motion of that comet, is found to be correctly predictive, on the supposition that the orbit of that comet is elliptical.

What is the whole number of comets circulating round the sun, we are totally ignorant: about 150 have been observed with sufficient attention to mark the rates of their motion, their obliquities to the ecliptic, and other particulars which come under the general name of the *elements* of a comet. Out of this number, however, there are but three whose returns, after certain periods, have been correctly predicted: so vague and unsatisfactory is the knowledge which we possess of these bodies, that only three, out of the

thousands which probably exist in space, have returned to particular spots in the heavens, at times which had been foretold. These three are named after the astronomers who calculated the periods of their return,—Halley, Encke, and Biela.

In 1531 a comet appeared, of which the velocity of motion, and other particulars, were noted: in 1607 another appeared, which presented similar features to the former: in 1682 Halley, the great astronomer, observed a comet, which presented nearly the same features as the two former. Now there is an interval of about seventy-six years between these eras, and Halley thought it probable that there had not been three different comets visible in those three years, but that they were successive appearances of the same comet. On calculating the extent of its orbit, he came to the conclusion that it would complete a revolution about the sun in about seventy-six years, and he boldly predicted its return in about 1757. It did not appear in that year, but in 1759; and the retardation is considered to have been due to the action of Saturn and Jupiter upon its mass, when near those planets, whereby it was delayed in its journey as much as 618 days. This effect from Saturn and Jupiter was foretold by the French astronomer, Clairaut, who fixed the time of its coming to the *perihelion*, the *nearest* part of its path to the *sun*. The event proved his correctness, within one month. It again appeared in the autumn of 1835, forming a period of about seventy-six years from the preceding appearance. There is reason to believe that an appearance of this comet can be traced back as far as 130 years B. C.; and that it is the same comet that was seen in the years 323 and 399, when it was described as being of vast magnitude and horrible aspect. This is also supposed to be the comet which appeared in 550, 855, 930, and 1006; in which latter appearance, its nucleus is reported to have been four times as large as the planet Venus. It was seen in 1230, 1305, and 1380, and again in 1456: at this last visit it was accompanied by a tail, which extended over sixty degrees of the heavens, and gave rise to so much terror and consternation, that Pope Calixtus ordered prayers to be offered up from all parts of Christendom, for the removal of the comet and its malign influences. The Turks were engaged at this time in a successful war against Greece; and when Europe was fearing nothing less than subjugation at the hands of the victorious Turks, this comet, having a tail in the form of a Turkish sabre, was regarded by the tribes of the West as the emblem of divine vengeance. After this, its appearances and progress are regularly recorded to the present times. In the sixteenth century it is said to have displayed a fine gold colour. Halley, in 1682, describes it as being as large and bright as Jupiter, with a tail of 30°. The inclination of its orbit to the ecliptic is about 17½°. In 1835, the length of its tail to the naked eye was about 6°; with a telescope it appeared larger.

Encke's comet performs its revolution round the sun in about 1208 days. This comet had been observed in 1789, 1795, 1801, and 1805, and had presented various aspects to an observer; sometimes being accompanied by a tail, and sometimes not. When it appeared in 1818, Encke, Professor of astronomy at Berlin, determined the period of its revolution as given above, and predicted its return in 1822. It returned in that year, but was not visible in England; at Paramatta, in New South Wales, however, it was seen: it appeared again in 1825, 1828, 1832, and 1835. It was visible with a good telescope between August and December of last year.

The orbits of these comets are elongated ellipses; which may be strikingly illustrated by the orbits of Encke's and Halley's comet. When the former is nearest to the sun, it is within the orbit of Mercury; that is, nearer to the sun than any of the planets; but when it is at its *aphelion*, or greatest distance from the Sun, it nearly approaches the orbit of Jupiter, which is thirteen times as distant as Mercury is from the Sun. Hence, the *aphelion*, or *furthest part* of the comet's orbit from the *Sun*, is ten times more distant from the sun than the perihelion. Halley's comet, when in perihelion, was between Mercury and Venus; in aphelion, it is twice as far off as Uranus.

The three comets, of which we here speak, are regular members of the solar system; for they move round the Sun, as their focus, in accordance with the law of gravitation. The inclination of the orbit of Encke's comet to the plane of the ecliptic is about 13½°; and it moves like the planets, from west to east.

Its present appearance is like that of a small round nebula, without any tail. It is rather brighter at the centre than at the edges; but still its light is so faint, that it is not seen without difficulty. It does not influence any other body of the solar system; but itself suffers some perturbations from the attractions of the planets. Hence we infer that this, like most of the other comets, is little more than a vaporous globe of matter, without any specific solidity.

This comet would be comparatively insignificant, but for the aid which it affords in establishing the undulatory theory of light. According to this theory, space is considered to be filled, apart from the atmospheres of planets, with an extremely rare medium termed *ether*, by the undulations of which light is propagated. This medium, though offering no sensible resistance to the motions of the planets, was thought to be likely, if existing, to impede, to a certain extent, the passage of so airy a thing as a comet. Accordingly Professor Encke, having calculated the return of this comet upon the consideration of the *vacuum* of space, the actual time of the comet's return differed two days from the calculated return, in consequence, as asserted, of a resisting operation upon the motion of the comet in its path. But the ultimate effect of this retarding influence was discovered in *hastening*, not in deferring, the time of the appearance of the comet! for, as the all-pervading ether caused the comet to advance somewhat more slowly, the centrifugal force of the comet was diminished, whereby the solar attraction for it was increased: so that, by being drawn gradually nearer to the Sun, the time for its completing its revolution is, in consequence, diminished. In the course of time, therefore, this comet must fall to the sun. Like reasonings have been made to apply to other comets, and also to the Earth and the other planets; in order to convey to our minds the great moral lesson, that *all things have an end*. The Psalmist thus addresses the Almighty, (Ps. cxix. 96,) "I have seen an end of all perfection: but thy commandment is exceeding broad;" implying thereby, that all created nature is bounded by limits, which, however wide, are within the grasp of the Maker of all things.

Biela's comet had been noticed in 1772 and 1806, and when it appeared in 1825, Biela, a German astronomer, of Josephstadt, calculated the period of its revolution, and predicted its return in 1832:—this prediction was fulfilled, and the period of the revolution of this comet is considered to be established at 2440 days. Its last appearance was in 1832. It is spoken of as a small, insignificant comet, without a tail, or any appearance of a nucleus. The inclination of its orbit to the ecliptic, is about 13¼°; and so near does its path approach that of the Earth at the intersection of the planes, that it is considered that, in 1832, if the Earth had been one month in advance of its annual journey, it would have passed through this comet.

These are the only comets of whose periods we have any certain knowledge. There are, however, two others whose periods have been stated; but the times are not yet arrived for testing the accuracy of the predictions. One of these comets appeared in 1264, and again in 1556—an interval of 292 years; and it is expected again in 1848. The other comet, seen in the frontispiece, was observed by Newton in 1680, and he predicted its return in 575 years: a long period must therefore elapse before the truth of this calculation, or conjecture, can be verified. The tail of this comet, which is several times noticed in history, was of such vast extent, that when the head of the comet was in the horizon, the extremity of its tail was in the zenith. This observation was made at Constantinople. Of such sights as these, well might Dr. Young say—

> Hast thou ne'er seen the comet's flaming flight?
> The illustrious stranger passing terror sheds
> On gazing nations, from his fiery train,
> Of length enormous.

A remarkable comet appeared in the year 1770, which was found to revolve in a period of about five years; but the prediction of its return was not verified, in consequence of its getting too near the satellites of Jupiter, which, though undisturbed themselves by the comet, so deranged the motions of the comet, as to thrust it from its original path, and it has never been seen again. If this be correct, it shows that the mass of the comet is spare indeed. The comet of Encke is observed to grow less as it approaches the Sun, and to amplify at its departure from the solar presence; owing, it is said, to the vaporizable matter being converted into gas.

The tail of the splendid comet of 1680, observed by Newton, 120,000,000 miles in length, was observed to issue forth from the head of the comet in two days. This tail, being opposed to the Sun, is supposed to have been caused

Fig. 45. *Nebulæ.* *Uncertain.*

MAGNITUDES OF THE STARS, FROM THE FIRST TO THE SEVENTH.

by the Sun to be emitted. The tail of the comet of 1769 was 48,000,000 miles in length, and that of 1811 was 108,000,000 miles in length.

The diameter of the body of this last was 50,000 miles. It is thought that the matter of the comets is discharged at their tails, by the agency of the Sun; and that the gravitating power of the comet is not sufficient to re-collect it.

FIXED STARS.

When I behold this goodly frame, this world
Of heaven and earth consisting, and compute
Their magnitudes, this earth, a spot, a grain,
An atom, with the firmament compared,
And all her numbered stars, that seem to roll
Spaces incomprehensible (for such
Their distance argues, and their swift return
Diurnal) merely to officiate light
Around this spacious earth, this punctual spot,
One day and night, in all their vast survey
Useless besides; reasoning I oft admire,
How nature, wise and frugal, could commit
Such disproportions, with superfluous hand,
So many nobler bodies to create,
Greater so manifold to this one use,
For ought appears, and on their orbs impose
Such restless revolution day by day
Repeated, while the sedentary earth,
That better might with far less compass move,
Served by more noble than herself, attains
Her end without least motion, and receives,
As tribute, such a sumless journey brought
Of incorporeal speed, her warmth and light;
Speed, to describe whose swiftness number fails.

THE sublimity and beauty of the starry heavens is such a common subject of remark, that we need not stop to expatiate on it; but we wish to treat of some matters connected with the stars, which have not hitherto engaged our attention.

The stars appear much more numerous at first sight than they are found to be on reckoning those which are visible: this is occasioned by the glittering and twinkling, and the apparent confusion in which they seem mingled together. They have been, as we before stated, clustered into constellations, which are known by certain names; but besides this they are divided into classes, according to their *magnitudes*, the number of recognised magnitudes visible without a telescope being seven (fig. 45); which is continued, with the aid of powerful instruments, up to the sixteenth. It is, however, necessary to remark, (and nothing can give such a striking proof of the immense distance at which they are placed from the Earth), that, although we speak of *magnitudes*, the stars have really no appreciable magnitude at all: they did not appear larger through Sir W. Herschel's telescope, which magnified 6000 times, than they do to the naked eye; but they appear *much brighter* when viewed through a telescope; sometimes too bright to be gazed upon without pain to the eye, as we are told is the case when Sirius, the brightest of the fixed stars, appears through a telescope. It is, therefore, more properly speaking, by the *brightness* that we compare different stars, and not by the magnitude. Every star appears through a telescope to be a mere point of light, without appreciable diameter; and this is one of the circumstances which have baffled all the attempts of astronomers to estimate the distances of the stars.

The fact of the impossibility of magnifying the fixed stars together with that of their affording no sensible parallax, has hitherto put it out of our power to do otherwise than surmise their distances. The only use of the telescope, with reference to the fixed stars, is to penetrate more and more into space, and bring out, as it were, still greater numbers of them; so that the quantity of them seems infinite; for they multiply and spring forth, as optical aid is increased. Hence two things are clear: first, that what we call magnitude is only apparent, being referred to the power of the eye and telescope; secondly, that it depends upon distance, size, or actual quantity of light, each, or all combined.

About 50,000 stars have been catalogued; that is, their celestial latitudes and longitudes are entered, just in the same way as the position of a place on the Earth's surface. It is observable, however, that a different mode of proceeding is here adopted from that which is employed in terrestrial measurements. We have stated that the ecliptic is the path in the heavens, in which the Earth moves round the Sun, or in which the Sun appears to move round the Earth. This circle in the heavens is the place from which celestial latitudes are measured, in the same way as the Earth's equator is the beginning of terrestrial latitude. The positions of the stars are referred to this circle by such kinds of expressions as are used with respect to places on the Earth;—that is, a star being north or south of this line, has such or such latitude. As terrestrial longitude is measured on the circle which forms the 0 or zero of latitude: so, in like manner, is celestial longitude reckoned on the ecliptic, which is the 0 or zero of celestial latitude. But a point of commencement is necessary here, as well as on the Earth's surface; and the point chosen, is the *vernal equinox*, or one of the points in which the celestial equator cuts the ecliptic:—a point which, as we have said before, is called the first point of Aries. From this point then, the longitudes of the stars are reckoned; and when the latitude is previously known, we can designate the position of any star in the heavens, by this double mode of comparing its position with regard to the ecliptic.

For some astronomical purposes, it is deemed more desirable to refer the position of a heavenly body to the celestial equator, instead of the ecliptic. The celestial equator is sometimes termed the *equinoctial*, from the circumstance that, when the Sun appears in it, the days and nights are equal all over the world; and it is a circle supposed to be formed by the extension of the Earth's equator to the concave of the heavens. The distance from the celestial equator to the pole-star, is supposed, as on the terrestrial globe, to be divided into 90°; and, according as any heavenly body is situated North or South of the equinoctial, it is said to have a North or South *declination*. The East or West position of the heavenly body, considered with reference to the equinoctial, differs from longitude as reckoned on the ecliptic, in two ways: 1st. it is called *right ascension*, and not longitude: 2nd. it is usually reckoned in hours, instead of degrees. The point from which the right ascension is reckoned, is the same as with the longitude; viz., the first point of Aries: so that if the Sun be exactly at the opposite part of the heavens from the first point of Aries, he is said to have twelve hours of right ascension; twelve hours being equivalent to 180 degrees: such a position takes place on the 21st of September, when the sun enters Libra, which is diametrically opposite to the sign Aries.

By these two methods, the position of any heavenly body whether Sun, Moon, Planet, Comet, or Fixed Star, can be determined, and described with as much exactness as the position of any place on the Earth's surface.

Besides the classification of the fixed stars into constellations, it is customary, in order to distinguish one star from another, in any one constellation, to attach letters, one to each star, by which they shall be known. The letters of the Greek alphabet are used for this purpose; and, when they are all exhausted, numerals are employed, at least for the stars of small visible magnitudes. Thus, there is a star marked γ in the constellation, called Draco, or the Dragon, near the North Pole. This star comes once every day, almost precisely into the *zenith* of London, or *immediately overhead:* this star has of late years engaged much of the attention of astronomers, with the hope of obtaining, by its means, some indications of the distance at which the stars are situated from the Earth. For this purpose, there was erected at Greenwich, about five years ago, a zenith micrometer. A micrometer, as the word by its derivation implies, is an astronomical instrument for *measuring small* angular distances. The object of this instrument, which was twenty-five feet long, was to measure the angular meridian-distance from the zenith of the star γ Draconis, at different times of the year, or at different parts of the Earth's orbit, which is the same thing. A variation in this angular distance at the lapse of six months, would have proved an annual *parallax:*—but this the observers at Greenwich failed to discover, and the subject remains as it was before. If the observers had succeeded in detecting a parallax of only one second of a degree, it could have been proved by calculation that this, or any other of the fixed stars, could not

have been distant from the Earth, less than 19 billions of miles.

In order, therefore, tnat astronomers may know this star when spoken of, it is called *γ Draconis*, that is, the star in the constellation of the *Dragon*, which is marked by the Greek letter γ. Some of the stars which are distinguished for their superior brilliancy, have particular names attached to them;—such as Sirius, in the right shoulder of the constellation Orion; Rigel, in his left foot; Arcturus, &c.

The principal fixed stars, which lie within a convenient distance of the moon's path, are used for taking *Lunar distances*, in order to enable mariners to deduce their longitude. The distances of particular stars from the moon, at certain regularly recurring times, when the moon is visible, are calculated at Greenwich, and set down for some years in advance according to Greenwich time. As the motion of the moon is quicker than that of any other heavenly body as seen from the earth, these lunar distances soon change. If then a person on the ocean wishes to know his longitude, and he finds, for instance, that on such a day and hour, according to the *Nautical Almanack* such a particular star is so many degrees distant from the moon, but that this lunar distance occurs as seen from the ship, an hour sooner than the Greenwich time:—in this case, his longitude is 15° W. If the recorded distance had occured an hour later, his longitude would have been 15° E.

The stars beyond the 7th magnitude are called *telescopic* stars. Those, which are visible to the naked eye at any one time, are supposed not to exceed 2,000, notwithstanding the countless assemblage which appears to be present. This results from a sort of optical delusion, whereby the eye is disconcerted by the apparent want of order: but, with the telescope, Sir. W. Herschel computed that a small portion of the heavens, not exceeding 15° in length, by 2° in breadth, exhibited not less than 50,000 stars, from which it has been calculated that the same instrument would make visible in the whole starry sphere, not less than 75 millions of stars! The mind shrinks within itself at the contemplation of such a vast array,—and still more, when it is considered that this number is limited by the imperfection of human contrivances; for there can be no doubt, that, if our telescopes were more powerful, the number of visible stars would be greatly increased. This observation may refer to that thin gauzy band of light, which seems to surround the dome of the heavens on a clear evening, when the moon is absent. It has the name of the *Galaxy*, or *Milky-way*. By the power of modern instruments this has been shown to be a vast congregation of stars so small, or so far off, that to an observer on our Earth they present only, by their association, a dim zone of light. The elder Herschel observed about 600 stars in his telescope at the same time, and they continued as numerous for a quarter of an hour. He reckoned up in one portion of the Milky-way, about 250,000 stars.

The stars are always spoken of as being *fixed*; and if we regulate our expresions by the analogy of general movements, they are certainly fixed; but astronomers have of late years seen reason to believe that a very minute motion may be detected in some stars; that is, that a certain group of stars does not present the same relative distances between the stars of which it is formed at one time, as at another. These quantities of motion, or of difference, are, however, so inconceivably small, that they belong to the refinements of astronomy, and need not be discussed here.

But we have now to notice a very remarkable circumstance, which seems to afford evidence that the stars are luminaries like our Sun, and have planets revolving round them; that each one

> Informs a system in the boundless space,
> And fills with glory its appointed place:,

When the stars are observed with close attention by means of a good telescope, many of them are found to be *double*; that is, to consist of two smaller stars, the dark division between them being too faint to be distinguished in an ordinary observation. In some instances, this may occur from one star being almost directly behind another; and though at an immense distance off from the first, yet seeming to our vision to lie in the same line: but, in other instances, it is found that one star revolves round the other, or the two revolve round some point situated between them. Very little was known on this subject until of late years, when Sir W. Herschel, and afterwards Sir J. South and Sir J. Herschel, distinctly showed that such a revolving motion was perceptible; at one time the satellite, or smaller of the two stars, would disappear, as if it had passed round behind the other in the course of its motion, just as Jupiter or Venus is sometimes invisible to us, on account of being on the opposite side of the Sun; or the satellites of Jupiter, by passing round the body of that planet. There is a double star (see fig. 47,) in the constellation called the *Great Bear*, in which the two component stars revolve round each other in about 60 years; nearly a whole circuit has been performed since its discovery in 1781. About 3000 of these double stars have been observed, and formed into a catalogue, in which their positions, with respect to latitude and longitude, and the relative positions of the two component stars of each, are entered with great exactness, in order that future observers may have the means of comparing the different appearances of these stars at different times.

In about fifty instances the stars have been found to be *triple*, or three stars revolving about a common centre. In some few cases *four*, and even *five* stars have been detected revolving in this way; thus furnishing a further analogy to the composition and relative action of the different bodies which form our own system.

Another peculiar appearance which presents itself in the heavens are *nebulæ*, which are dim, whitish, *cloudy* patches, observable at some parts of the firmament. When examined with a powerful telescope, many of them are found to consist of clusters of very minute stars, so thickly studded together, that the light of all is combined into one faint sheet, as it were, of light, and thus presents the thinly-luminous appearance by which the nebulæ are distinguished. In other instances, however, the most powerful telescopes have been unable to separate the nebulæ into stars, or clusters of stars; but the whole maintains the same thin and milky appearance, whether seen with or without the aid of the telescope. In this latter case, it is supposed that the nebulæ are formed of clusters of stars as in the former case; but that they are so extremely distant, that the light they shed is unable to reach the eye, except in a combined form from the whole of the nebulæ taken together. Some of these nebulæ appear like a faint luminous atmosphere surrounding a star of some brilliancy. Sir W. Herschel has left descriptions of about 2000 nebulæ, which he observed at different parts of the heavens.

It is considered to be probable, that the fixed stars are SUNS, having planets revolving round them in the immensity of space; and it has been observed, that there are stars of all the colours of the spectrum. The stars are usually discovered by the eye from planets by their twinkling, which arises, probably, from some unequal refraction of light, in consequence of the distance of its path. There are stars seen now in the heavens which did not appear formerly, and many have disappeared, which are recorded as shining with brilliancy in former ages. Some stars appear and disappear alternately; of others the magnitude and brilliancy are variable.

When we come, therefore, to consider the vast distance of the fixed stars with the progressive, though rapid, motion of light, it is quite clear that many stars which *now* appear shining, may have been annihilated long ago, and that the last beams which they shed may take years in reaching this earth. If our Sun were suddenly extinguished, we should not know it until eight minutes after the extinction; and if it were suddenly rekindled, its rays would take eight minutes in order to reach us.

> How distant some of the nocturnal suns!
> So distant, says the sage, 'twere not absurd
> To doubt, if beams, set out at Nature's birth,
> Are yet arrived at this our foreign world;
> Yet nothing half so rapid as their flight.—YOUNG.

In order to acquire a knowledge of the aspect of the heavens, it is necessary for those who live in the northern hemisphere to direct their attention to the *polar star*. This is one of the chief stars of the constellation termed the *Little Bear*, (see fig. 47,) and is of the second magnitude. It is about $1\frac{1}{2}°$ from the pole; and, saving the small circle which it thus describes, it is always in the same position at every hour of the day and night, and at every season of the year. To the point, from which this star is about $1\frac{1}{2}°$ distant, there is, southward, a corresponding point, round which *two* points the concave sphere of the heavens, studded with stars, seems to turn; this being, in reality, due to the diurnal motion of the earth on its axis. The stars round about these two points are called *circumpolar* stars, as revolving constantly about the poles; and those which, in consequence, never set to our and more northern latitudes, are

termed stars of *perpetual apparition*, because they are constantly above the horizon. The stars *α* and *β*, in the Great Bear are called the *Pointers*, because, if we follow them, they lead almost in a right line to the Pole-Star:—they serve, therefore, to *point out* this star. After the Great and Little Bears, which are very conspicuous, and easy to remember, the other principal constellations may be readily recognised. Nearly surrounding the Little Bear is the constellation Draco. In the upper corner of the right hand, appear parts of the constellations Lynx and Camelopardalus; and at the lower corner of the left hand, part of the constellation Boötes.

The constellation Orion, the Pleiades, and the star Arcturus, of the first magnitude, are known in Scripture. The term *Mazzaroth*, used in the book of Job, xxxviii. 32, is supposed to imply the *constellations of the Zodiac*, which are thought to be meant by Joseph, when he spoke of the sun, moon, and eleven stars, bowing down to pay him homage, himself being the twelfth.—Gen. xxxvii. 9. But the science of astronomy was not much encouraged at any time among the Jewish people, lest they might the more easily be allured to join in the idolatries of the neighbouring nations, all of whom eagerly gave themselves up to the worship of the "heavenly host."

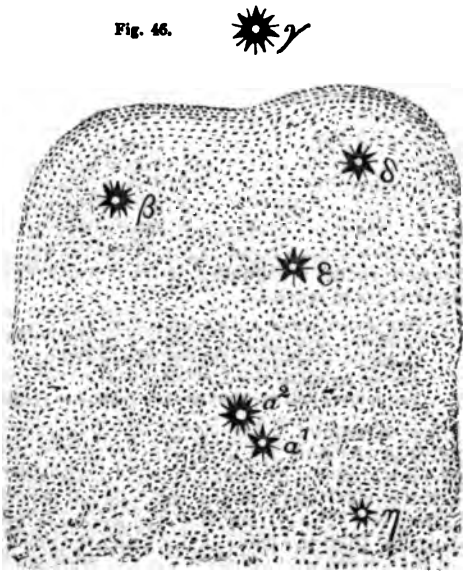
We ought not to omit to mention, that in the Southern Hemisphere is the constellation called the CROSS, which, from the disposition of the principal stars, is a type of that sacred emblem; it is almost entirely enveloped by the southern part of the milky way, as shown in the figure. This is, perhaps, one of the justest configurations that astronomers have ever made, and is thus alluded to by the poet Rogers, who also speaks of the superior radiance of the stars in the heavens below the line:—

> ..... And now in opener skies
> Stars yet unnamed of purer radiance rise!
> Stars, milder suns, that love a shade to cast,
> And on the bright wave fling the trembling mast!
> Another firmament! the orbs that roll,
> Singly or clustering, round the southern pole!
> Nor yet the four that glorify the night—
> Ah, how forget, when to my ravished sight
> The CROSS shone forth in everlasting light!

The mariners in the *Lusiad* also thus apostrophize this constellation:—

> While nightly thus the lonely seas we brave,
> Another Pole-star rises o'er the wave;
> Full to the south a shining CROSS appears;
> Our heaving breasts the blissful omen cheers.
> Seven radiant stars compose the hallowed sign,
> That rose still higher o'er the wavy brine.

Fig. 46.



Owing to the annual motion of the Earth, the Sun appears to move among the zodiacal constellations from West to East. Hence it is that, while the whole dome of the fixed stars seems to move round the earth from East to West, in consequence of the Earth's diurnal motion, the stars appear to rise about 3′ 56″ sooner every evening, and thus seem to gain nearly one whole revolution over the Sun in a twelvemonth, which is due to the Sun having finished its circular course through the ecliptic. The Earth completes one revolution on its axis in twenty-three hours and fifty-six minutes, which is termed a *sidereal* day, being the time which elapses from any star coming upon the meridian till its arriving there again; this would, therefore, be the length of the day, were the Earth stationary; but, as we said before in other words, the Earth advances nearly one degree in its orbit in one day, or the Sun seems to move this space in the ecliptic.

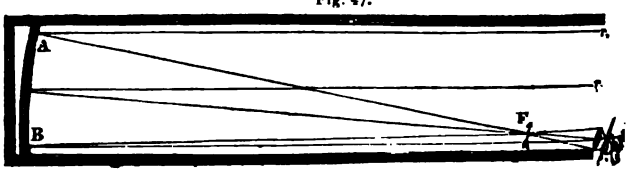
When the Moon, in her passage round the Earth, passes over any of the fixed stars or planets, she is said to *occult*, or *hide* them; and such a phenomenon is termed an *occultation*, an observation of which is useful in determining longitude.

One of the latest opinions respecting the cause of *shooting stars* is, that they are fragments of planets, which, in the course of their revolutions, come, at certain times, within visible range of the earth.

Having had occasion, more than once, to refer to the discoveries made by Sir William Herschel, in the celestial regions, we cannot altogether dismiss the subject, without describing the stupendous and wonderful instrument, which he himself constructed, and with which he enriched the modern state of astronomical knowledge. The magnifying powers of this instrument exceeded all that had ever been known, previously or since.

We will suppose the reader to be at least moderately acquainted with the principles and use of the common refracting telescope: he will therefore observe that the subjoined figure affords a representation of Herschel's REFLECTING Telescope:—

Fig. 47.



Let us suppose AB to be a concave reflector, and *r*A, *r*B to be rays proceeding from a distant object, such as a star. The reflector AB is not placed symmetrically across the tube, but has such a degree of inclination given to it, as will bring the rays to a focus at F, near the margin of the mouth of the tube. The eye of the observer being now placed at that point, he will see the image formed by the focalization of the rays. The object to be obtained in thus bringing the rays to a focus at the margin of the tube, instead of at the centre of its diameter, is, that the body and head of the observer may intercept as few rays as possible; for it will be seen that it is quite impossible for him to look into the tube, without obstructing the passage of some of the light proceeding from the object. But this obstruction is thus limited as much as possible.

This telescope was begun by Sir William in the year 1785, by the pecuniary aid afforded to him by King George the Third, who was his patron. Herschel superintended the whole of the construction of it himself; and he had as many as forty workmen employed upon it at once. In February, 1787, he had the first view through this telescope, although it was not completely finished till August, 1789.

The great reflector AB was forty-eight inches in diameter of polished surface. A speaking trumpet was fitted to the side of the telescope, for the observer to communicate the result of his observations to an assistant below, who was stationed in a small house, and provided with various instruments for measuring time, the positions of the stars, &c. This vast tube was moved about in any direction, by means of a large and complicated apparatus. The eye-pieces, through which the observer viewed the reflected image of an object, were held at the mouth of the tube by a sliding apparatus, by which the attention could be directed to any particular part of the speculum AB.

The frame-work of this instrument having been found to be greatly decayed, after it had remained thirty years in its place, the whole was taken down and replaced by a smaller one on the like construction by Herschel's son, one of the most distinguished astronomers of modern days.

No sooner had the great telescope been erected by Sir W. Herschel, than he began an important series of discoveries by its means. He discovered the sixth satellite of Saturn (five only having been previously known,) on the day

that this instrument was completed. He had already discovered the planet Uranus, as we related in our last paper; a circumstance, such as had never taken place since the days of the most ancient nations of the world. Moreover, by the aid of the new telescope, Herschel distinguished, one by one, six luminaries revolving about it; as also the seventh satellite of Saturn. The same able astronomer also discovered that the ring which surrounds the planet Saturn, is not only divided into concentric belts by a dark circle, as had been already noticed by Cassini, but that the ring likewise revolved about the body of the planet.

The art of constructing telescopes, has, like all other arts, advanced by degrees to its present state of comparative perfection. In the case of the reflecting telescope, which is, for astronomical purposes, a vast and efficacious improvement upon the former mode of using these instruments, there have been several sorts at different times constructed. These go by the names of the Newtonian, the Gregorian, the Cassegrainian, Brewster's, and Herschel's. The principle of them all is the same: but the circumstances, in which they differ from one another, are chiefly in the manner in which the image of an object is conveyed to the eye of an observer. In every instance, rays of light from the celestial body, pass into the tube of the telescope which is *open* at the end *nearest* to the object, and fall upon the surface of the speculum at the bottom of the tube, as shown in the preceding figure. These rays, after reflection from the surface of the speculum, meet again in a focus near the upper end of the tube, and there form a small image of the object; which image is conveyed to the eye of the observer by one of the five different contrivances, which thus form the points of difference between the various reflecting telescopes.

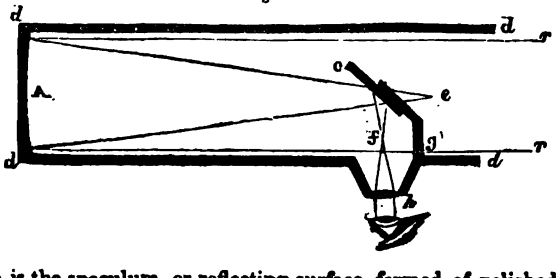
Of Herschel's telescope we have already spoken. Into the merits of the telescopes of Gregory, Cassegrain, and Brewster, it is not necessary here to enter: but we cannot refrain from giving a few brief notices of Newton's genius as developed in the construction of a reflecting telescope, for exploring those celestial tracts, which his skill and perspicacity were employed in reducing to order and harmony, for the better understanding of those who were to come after him.

It has been well remarked of Sir Isaac Newton, that it was his brilliant fortune to improve almost every subject to which he directed his gigantic mind. He was the first to put in practice the idea of employing reflected light for the formation of the image in a telescope. Vast and splendid as were the theoretical and mathematical powers of his mind, yet he did not disdain to construct with his own hands the instrument which his inductive reasoning told him would serve the purpose of a telescope. He, accordingly, made the first reflecting telescope which the world ever saw, and which is now in the museum of the Royal Society of London:—a precious memento of the ingenuity of one whose name will never die.

We are told that Newton's first reflecting telescope was 6¼ inches long, and had an aperture of about 1¼ inches. The eye-glass was inserted in the side of the tube, and was one-sixth of an inch deep. This instrument, although so small, magnified thirty-five times, and enabled Newton to see the crescent-form of Venus, and Jupiter's satellites. He then made another, which was 2¼ inches in diameter, and therefore gave a larger reflecting surface to the speculum at the bottom of the tube.

The following figure shows the construction of the Newtonian reflecting telescope.

Fig. 48.



A is the speculum, or reflecting surface, formed of polished metal, either spherically or parabolically curved:—the latter is more correct, but the former is more easy to construct. This speculum, as we saw in the case of Herschel's telescope, is placed at the end of the tube *d d d d*, and has such a degree of curvature, that the rays *r d*, *r d*, from any celestial object, will, after reflection, be conveyed to a focus at *e*, near the mouth of the tube. But, before they reach this point, their progress is arrested by a plane mirror, *c*, so placed as to make an angle of 45° both with the length and with the diameter of the tube. This plane mirror is held in its place by an arm or bracket, *g*, fitted to the side of the tube, but at the same time capable of sliding along it, in order that the distance between the two reflectors may be increased or diminished at pleasure. Let us now suppose that rays from a celestial object are entering the tube, and that they are reflected from the surface of the speculum A: instead of meeting at *e*, they are reflected a second time, from the small plane mirror *c*, and cross each other at the point *f*, at which point of intersection an image of the object is formed. At this point of the process is the following adaptation:—a convex lens is fitted into a socket *h*, the focal power of which lens is such, that the image is in that focus, and the magnitude of the image is increased.

Many disadvantages resulted from the necessity of the observer looking in at the *side* of the tube; and inconvenience manifestly results from looking down the mouth of the tube. Those who have attempted to construct reflecting telescopes, have always had in view the removal or diminution of the difficulties mentioned before. Complete success, without loss of light, has not, however, attended their efforts.

From the time when Galileo made his telescope, which was of the common refracting sort, with eye-pieces, one at each end of a tube, to the construction of Herschel's great reflecting telescope, a period of nearly 200 years, the knowledge of the heavens rapidly progressed. The construction of the Newtonian telescope was an event mid-way; but the further extent of our knowledge of "the argent fields above," will have to depend mainly on the further improvement of our telescopes.

In concluding the subject of ASTRONOMY, we cannot do better than use the thoughtful and eloquent words of Chalmers:—

"The first thing which strikes a scientific observer of the fixed stars, is their immeasurable distance. If the whole planetary system were lighted up into a globe of fire, it would exceed, by many millions of times, the magnitude of this world, and yet only appear a small lucid point from the nearest of them. If a body were projected from the sun, with the velocity of a cannon-ball, it would take hundreds of thousands of years before it described that mighty interval which separates the nearest of the fixed stars from our sun and from our system. If this earth, which moves at more than the inconceivable velocity of a million and a half miles a day, were to be hurried from its orbit, and to take the same rapid flight over this immense tract, it would not have arrived at the termination of its journey after taking all the time which has elapsed since the creation of the world. These are great numbers, and great calculations; and the mind feels its own impotency in attempting to grasp them. We can state them in words. We can exhibit them in figures. We can demonstrate them by the powers of a most rigid and infallible geometry. But, no human fancy can summon up a lively or an adequate conception—can roam in its ideal flight over this immeasurable largeness—can take in this mighty space in all its grandeur, and in all its immensity—can sweep the outer boundaries of such a creation—or lift itself up to the majesty of that great and invisible arm on which all is suspended.

"But what can those stars be which are seated so far beyond the limits of our planetary system! They must be masses of immense magnitude, or they could not be seen at the distance of place which they occupy. The light which they give must proceed from themselves; for the feeble reflection of light from some other quarter, would not carry through such mighty tracts to the eye of an observer. A body may be visible in two ways. It may be visible from its own light, as the flame of a candle, or the brightness of a fire, or the brilliancy of yonder glorious sun, which lightens all below, and is the lamp of the world. Or it may be visible from the light which falls upon it, as the body which receives its light from a taper, or the whole assemblage of objects on the surface of the earth, which appear only when the light of day rests upon them—or the moon, which, in that part of it that is towards the sun, gives out a silvery whiteness to the eye of the observer, while the other part forms a black and invisible space in the firmament—or as the planets, which shine only because the sun shines upon them; and which, each of them, present the appearance of a dark spot on the side that is turned away from it. Now

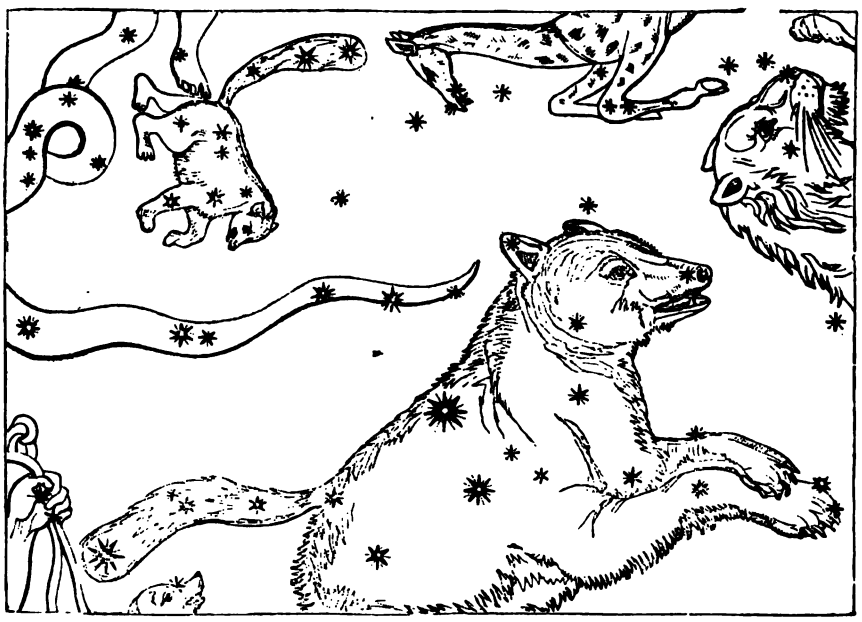
apply this question to the fixed stars. Are they luminous of themselves, or do they derive their light from the sun, like the bodies of our planetary system? Think of their immense distance, and the solution of this question becomes evident. The sun, like any other body, must dwindle into a less apparent magnitude as you retire from it. At the prodigious distance even of the very nearest of the fixed stars, it must have shrunk into a small indivisible point. In short, it must have become a star itself, and could shed no more light than a single individual of those glimmering myriads, the whole assemblage of which cannot dissipate, and can scarcely alleviate, the midnight darkness of our world. These stars are visible, not because the sun shines upon them, but because they shine of themselves, because they are so many luminous bodies scattered over the tracts of immensity; in a word, because they are so many suns, each throned in centre of his own dominions, and pouring a flood of light over his own portion of these unlimitable regions.

"At such an immense distance for observation, it is not to be supposed that we can collect many points of resemblance between the fixed stars and the solar star, which forms the centre of our planetary system. There is one point of resemblance, however, which has not escaped the penetration of our astronomers. We know that our sun turns round upon himself in a regular period of time. We also know that there are dark spots scattered over his surface, which, though invisible to the naked eye, are perfectly noticeable by our instruments. If these spots existed in greater quantity upon one side than upon another, it would have the general effect of making that side darker; and the revolution of the sun must, in such a case, give us a brighter and a fainter side, by regular alternations. Now, there are some of the fixed stars which present this appearance. They present us with periodical variations of light. From the splendour of a star of the first or second magnitude, they fade away into some of the inferior magnitudes; and one, by becoming invisible, might give reason to apprehend that we had lost him altogether; but we can still recognise him by the telescope, till at length he reappears in his own place, and, after a regular lapse of so many days and hours, recovers his original brightness. Now, the fair inference from this is, that the fixed stars, as they resemble our sun, in being so many luminous masses, of immense magnitude, they resemble him in this also, that each of them turns round upon his own axis; so that, if any of them should have an inequality in the brightness of their sides, this revolution is rendered evident, by the regular variations in the degree of light which it undergoes.

"Shall we say, then, of these vast luminaries, that they were created in vain? Were they called into existence for no other purpose than to throw a tide of useless splendour over the solitudes of immensity? Our sun is only one of those luminaries, and we know that he has worlds in his train. Why should we strip the rest of this princely attendance? Why may not each of them be the centre of his own system, and give light to his own worlds? It is true that we see them not; but could the eye of man take its flight into those distant regions, it would lose sight of our little world before it reached the outer limits of our system—the greater planets would disappear in their turn—before it had described a small portion of that abyss which separates us from the fixed stars, the sun would decline into a little spot, and all its splendid retinue of worlds be lost in the obscurity of distance—he would at last shrink into a small indivisible atom, and all that could be seen of this magnificent system, would be reduced to the glimmering of a little star. Why resist any longer the grand and interesting conclusion? Each of these stars may be the token of a system as vast and as splendid as the one which we inhabit. Worlds roll in these distant regions; and these worlds must be the mansions of life and of intelligence. In yon gilded canopy of heaven, we see the broad aspect of the universe, where each shining point presents us with a sun, and each sun with a system of worlds—where the Divinity reigns in all the grandeur of His attributes—where He peoples immensity with His wonders; and travels in the greatness of His strength through the dominions of one vast and unlimited monarchy.

"The contemplation has no limits. If we ask the number of suns and of systems, the unassisted eye of man can take in a thousand, and the best telescope which the genius of man has constructed, can take in eighty millions. But why subject the dominions of the universe to the eye of man, or to the powers of his genius? Fancy may take its flight far beyond the ken of eye or of telescope. It may expatiate in the outer regions of all that is visible—and shall we have the boldness to say, that there is nothing there?—that the wonders of the Almighty are at an end, because we can no longer trace His footsteps?—that His omnipotence is exhausted because human art can no longer follow him?—that the creative energy of God has sunk into repose, because the imagination is enfeebled by the magnitude of its efforts, and can keep no longer on the wing through those mighty tracts, which shoot far beyond what eye hath seen, or the heart of man hath conceived: which sweep endlessly along, and merge into an awful and mysterious infinity.

Fig 49.



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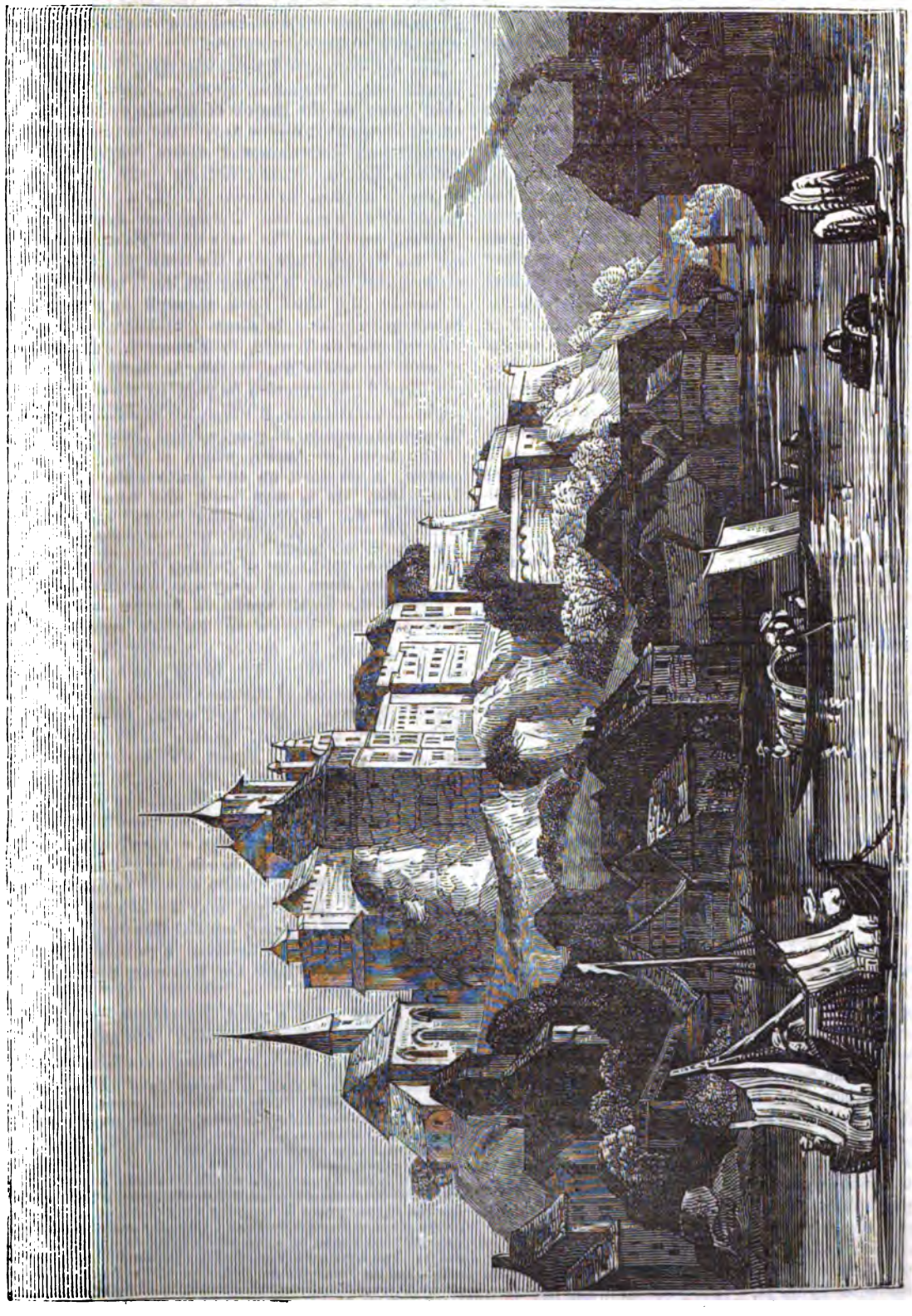

AARBURGH, ON THE AAR.

VOL. XIV.

THE AAR, AND THE CANTON OF AARGAU, IN SWITZERLAND.

AARBURGH, ON THE AAR.

THE three letters *Aar* form the root of three or four terms connected with the geography of Switzerland. For instance: the *Aar* is a river: *Aargau* is the canton, district, or province, of the *Aar: Aarburg*, a town on the Aar, and so on.

The river Aar springs from the foot of the Finsteraarhorn mountain, in the canton of Berne, in Switzerland, in the neighbourhood of the sources of the Rhine, the Rhone, the Reuss, and the Tessin. The streamlet which ultimately forms the Aar is derived from a large mass of ice called the glacier of Aar, in the canton of Berne. The valley in which this glacier lies, is divided into two parts by a hill, in each of which parts is a mass of ice, which furnishes a source for water. The higher glacier, towards the south, gives birth to the upper branch of the Aar; and the lower glacier, towards the north, serves as the source of the lower Aar; and these two brooks or streamlets soon join and form the river Aar. It is an icy plain, with insulated pyramids of ice, and masses of granitic rock, strewed over its surface. These glaciers extend to a considerable distance, and have been described by Meyer, who travelled there in 1812.

The spring coming from the upper glacier is the principal; and after it has united itself with the Finsteraar and the Lauteraar, it assumes the name of the river Aar, which rushes down the various precipices in a picturesque manner: at one place it is rushing with a great noise, and precipitating itself over falls: then it flows more softly through a valley; and then enters the Brieuser-see. It then leaves the Brieuser-see, and flows into the Thuner-see; after which it flows close to Thun and Bern, and is here augmented by the Saone, which has run its course from the canton of Friburg. It then extends into two or three neighbouring cantons; and at length into that of Aargau, and washes the town of Aarburg, which is represented in our frontispiece. It then proceeds onwards in its course, varying its width according to the nature of the country through which it flows; being 500 feet wide at Aarau, the capital of Aargau, and only sixty-five feet near Bruck, where it flows through a rocky channel. After taking in the various smaller streams of the canton of Aargau, together with the Reuss, it finally discharges its collective waters into the mighty Rhine, at Coblentz.

The town of Aarburg, situated on the banks of the river which we have been describing, is an extremely small place, containing (according to an account written in Germany a few years ago) not much above fifty houses and twelve hundred inhabitants. There is a copper-foundry in the town, and the cotton-manufacture is carried on to a small extent. There is also a castle, or rather, a sort of town-hall, which was built in 1660, and was then appropriated as a state prison for the canton of Berne; and when Michael du Crest, a Genevan Mathematician, was confined here, in 1754, he lessened the tedium of imprisonment by measuring from his prison, the height of the beautiful snowy mountains, which were within his view:—an instance among the many that might be adduced, that a well-stored and an intelligent mind is never without some object which will tend to make time pass more agreeably than to him whose mental stores are limited.

The canton of Aargau, of which Aarburgh is one of the towns, is a pleasant district, diversified by hills, mountains, and valleys. It is situated in the northern *part of Switzerland*, being bounded by Germany, on the north, the cantons of Zurich and Zug, on the east, the canton of Lucerne, on the south, and those of Basle and Berne, on the west. It contains an area of about forty square miles: and is divided into a great many pleasant valleys. It has about a hundred and fifty thousand inhabitants, scattered over twelve towns and two hundred and seventy-one villages. The inhabitants are for the most part Protestants, the number of Catholics being somewhat smaller; while the Jews number about seventeen hundred, and inhabit two villages, but without possessing municipal rights. The canton is one of the most industrious of all those in Switzerland, and is more a manufacturing than an agricultural country.

The last compound word springing from the same source, which we may mention, is *Aarau*. This is the chief town in the canton of Aargau; and, like Aarburgh, is situated on the Aar. Our readers would frequently find that names of towns, ports, mountains, districts, &c., take their rise from some common term which is applied to them all. Let us take for instance Exe, Exmouth, Exeter, and Exmoor, all in Devonshire. The *Exe*, is a small river, which flows into the British Channel: the town which is situated at the point where it discharges itself into the sea, *is Exmouth:* the chief town, through or near which it passes in its course, is *Exeter:* and the high ground situated near its source, is *Exmoor* *. In a similar manner the words Aar, Aarau, Aarburg, and Aargau, are formed: if attention be paid to these apparently slight circumstances, it will often assist the reader in the comprehension of geographical details.

The town of Aarau, which is the chief in the canton, is situated on the south side of the Jura mountains. It is well built, and has about three thousand five hundred inhabitants, about equally divided between Catholics and Protestants. They are an intelligent class of people, and are engaged in silk, cotton, linen, and other manufactures.

One of the small towns in Aargau is *Baden*, not Baden Baden, known to English travellers as a watering-place, but one of a similar character on a smaller scale. When Mr. Inglis was there, he found a supper prepared, at the inn at which he stopped, for a wedding-party, which had come from Zurich to make merry at Baden, because *dancing is not permitted in the Canton of Zurich*, unless by special permission of the government; and this is almost always refused. In order that the pleasure of a dance may be enjoyed without incurring the penalties, a certain number of persons must sign a paper declaratory of their intention. This is handed to the council; and if the conservators of public morals in the canton of Zurich think the dance may be allowed, and the public preserved in purity notwithstanding, permission is accorded; but it is asserted a refusal is generally the result. Public balls are, however, permitted once a week at Baden.

Mr. Coxe gives a vivid description of the valley along which the river Aar flows. He says,—

The road along this valley, though much narrower than

* The modern term *Exeter* is a corruption of the ancient Saxon *Ex-cester*. The postfix Caster, Chester, &c., answers to the Saxon *Ceaster*, and to the Latin *Castrum*; meaning an encampment or fort; or a fortified town. The river Exe is the *Wisk* of the Britons, who called Exeter *Caerwisc*, that is, the town on the water or river. They gave the same name to the town now called *Usk*, in Monmouthshire, which also stands upon a river still called *Usk*; this is another corruption of the same original British term, from which the modern *Exe* and *Esk* have been formed; the latter of which gives a name to no less than five rivers in Scotland; *Ouse*, the name of four rivers in England; and *Ouche*, on which stands Dijon, the chief city of Burgundy. The same word forms the first syllable of the Irish usquebaugh, and the Scotch *whisky*, both of which signify *the water of life*, (in which many a man has been drowned!) To the same term may be referred *Hex*-ham, in Northumberland, and *Wex*-ford, in Ireland; so that the terms *Waterford* and *Wexford* are synonymous.

that from Altdorf to the St. Gothard, is formed in the same manner along the steep declivities and acclivities, sometimes laid on arches, and sometimes carried over bridges thrown across tremendous precipices. It is paved with flat pieces of granite, so smooth and slippery that the horses would have perpetually stumbled, had they not been rough shod. In some places this road ran along the bare and rugged ridges; in others, down steps either cut in the rock, or formed by large stones, so that for several paces it resembled a staircase. The whole surface of the valley was thickly strewed with vast fragments of rock, while those which still hung on the sides of the mountains seemed threatening to overwhelm us,—the river, during the whole way, thundering along in a continual fall. This valley exhibits the same kind of scenes to which we have long been accustomed, except that the Aar rushes with more impetuous rage even than the Rhone or the Reuss, and is frequently so swelled with torrents as to ravage all the adjacent country: we saw many traces of these terrible devastations. We crossed it in several places, over stone bridges of a single arch, one of which equalled in the length of its span and the dreariness of its landscape, the "Devil's Bridge," in the valley of Schoellenen. About three leagues from Spital we had a glimpse, through the trees, of the Aar falling from a considerable height. In order to gain a nearer view, we climbed along the sides of a steep rock well covered with moss; I leaned against a tree that impended over the precipice, and saw the river rushing from the rock, and spreading into a kind of semicircular expansion in its descent. It fell with fury into a deep and narrow gulf, and then lost itself in the depth of the forest. The body of water was very considerable, and its perpendicular fall at least one hundred and fifty feet. The scenery was also solemnly majestic; the gray rocks on each side rising perpendicularly, and totally bare, except their tops, which were fringed with pines.

Mr. Inglis informs us that throughout Aargau, farming out land is unknown, with the exception of gardens near the large towns. The properties of those who are considered respectable Swiss peasants (for all proprietors who are not noble are called peasants), run from ten up to forty, or at most fifty acres; and good land is considered to yield ten per cent. profit. Many of the peasants have amassed considerable fortunes: but accession of fortune is never made apparent in their mode of living. From 100*l.* to 300*l.* per annum is the usual range of expenditure for persons living in what we should call *easy* circumstances; and it is asserted that not a single individual in the whole of Switzerland spends one thousand pounds per annum. Transference of land is not usual in Aargau; but when it is brought to the market, thirty-six thousand square feet of good land will bring about fifty pounds sterling. All land pays one-tenth part of the produce to government in the name of taxes.

Aargau is now one of the confederate states of Switzerland, but it belonged formerly to Berne, Zurich, and Baden, and has only been independent since the year 1798. We have stated that the inhabitants consist of Catholics and Protestants in nearly equal numbers; and from this circumstance arises a law, by which its supreme council must consist of members of both religions in equal proportions.

STRENGTH OF HUMAN MUSCLES.

Robert François Damiens, who attempted the assassination of Louis the Fifteenth, in 1757, after suffering the most unheard of tortures, was sentenced to be drawn in quarters by four horses. But although they exerted their entire strength, by drawing in four directions upon his limbs, for *fifty minutes*, the muscles were not torn from their attachments; and being still alive, the executioners were obliged to cut the tendons with a knife, in order to answer the law, which was that the criminal's body should be drawn in quarters. Precisely the same course was resorted to in the case of Ravaillac, who assassinated Henry the Fourth, the horses being unable to dismember the criminal's body.

LUMINOUS APPEARANCE OF THE SEA.

II.

There are, as has been shown, many varieties of the *Medusa* enumerated, as possessing the property of lumination. I shall, however, confine myself to a notice of some of the most remarkable which inhabit the North American seas. The most common of these are the *Medusa pellucens* of Sir Joseph Banks, one of the varieties of which is frequently met with in Boston harbour, and is known by the name of sun-fish,—and the *Medusa noctiluca* of Forskal, which is about three inches in diameter, and in figure like a mushroom. These last are found in great numbers about the banks which border the American coasts, and their presence may be regarded as an indication of the approach to soundings. They are of a brownish colour, and have tentacula, like the *M. pellucens*, but thicker and shorter. Their margin is fringed in the same manner, to the depth of about three-eighths of an inch, and, together with the rays or ribs, resembles a wheel of light, which enlarges or diminishes, as the animal contracts or expands itself.

The former of these, the *M. pellucens*, is of an hemispherical form, and ordinarily about five inches in diameter, and the summit of the crown is marked by a circle about an inch and a half in diameter. This is divided into six equal compartments, by the intersection of three dark lines; and from the circumference of this circle to the margin of the animal, proceed a great number of radiations, of a purple or brown shade. The border is fringed by a small thread-like membrane, in the form of scallops, not unlike the gills of fishes, and perhaps answering a similar purpose. From this depend a great number of long tentacula, or feelers, which probably serve the purpose of securing their prey, by entangling it in their folds. From the centre of the interior is suspended a kind of bag, terminating in four or five finger-like points, which appear to be the stomach and viscera. The lustre proceeds chiefly from the crown and margin.

This creature's light is extremely brilliant, and the flashes are frequently so vivid as painfully to affect the eyes of one who looks at them for any length of time steadily. I have known the water to be so filled with them on the American coasts, after the prevalence of an easterly storm, that it was dangerous to run for the land in the night, owing to the difficulty of distinguishing the lights on the shore, from those in the water which were flashing round us in every direction. At another time, in a heavy gale from the N. E., in latitude 35°, between the Gulf-stream and soundings, I witnessed one of the most magnificent, yet awful scenes, that can be imagined. The night was very dark, with frequent lightning in the western quarter, but until about eleven o'clock, nothing unusual was observable in the appearance of the sea. About that time it began to grow luminous, and by midnight the spectacle was sublime beyond description. The lightning appeared to mingle with, and career along a waste of fire; and each successive shower of spray enveloped hull, and cordage, and canvass, in a sheet of lurid light. The extremities of the spars were glittering with luminous points, and the plies of the rigging were gemmed in the same manner: as these were driven from one place to another by the wind, they presented the appearance of sparks from a forge. The effect of the light on the countenance was unpleasant in the extreme, and even appalling. The faces of the crew had a distorted and unnatural air, and wore a green and ghastly look, similar to that sometimes produced on the stage in incantation-scenes. The

whole left an impression on my mind which will never be effaced.

During the prevalence of these phenomena the wind hauled to S. E.; in this quarter it remained about an hour, during which time the light was more vivid than at any other period of its continuance. By straining some of the water carefully through a fine cloth, I obtained a great number of small globules of a blueish colour, and the water was left lustreless. These globules were in general not larger than a pin's head; a few of them were about the size of a small pea, and of an oblong figure. It is probable that these were the variety spoken of by Mr. Macartney as the *Medusa scintillans*, as they were like those he describes, so transparent as scarcely to be perceived in the water; and, when held to the light, they appeared like small drops of that fluid. They also manifested a disposition to collect together on the surface, where they assumed a pale-yellow colour. Upon replacing a number of those on the cloth in their native element, no light was visible while it was tranquil; but on agitating the vessel which contained them, a brief bright flash was thrown out, in consequence of so many of the insects shining at the same instant, resembling the faint lightning of summer evenings. Besides these and several larger medusæ, there were numbers of the small shrimp, *Cancer fulgens*, which gave a very brilliant light, throwing out the flashes apparently at pleasure, and especially when suddenly disturbed. On rubbing these insects to pieces on the cloth, its appearance was similar to the phosphorescence produced by decaying fish; this, however, endured but a very short time.

At about two o'clock in the morning, the wind suddenly veered to the N. W., and in a brief space, nearly all the luminous particles had vanished. Whether this sudden disappearance was owing to a change in the atmosphere, or to some other cause, I cannot pretend to determine; but I have subsequently observed, that in every instance, where the sea was more than usually filled with these particles, the wind was in the eastern quarter.

Similar appearances have been recorded by a number of scientific travellers. M. de Riville, a member of the French Academy of Science, observed the sea during a night on the coast of Malabar, to assume the appearance of a field of snow. Cook and De la Pérouse, also, in the course of their voyages, mention its becoming of a bright straw-colour at times. Père Bourzes, a French clergyman, in his voyage to India, so long since as 1704, witnessed, what he termed, luminous vortices, which he states appeared and vanished at intervals, like flashes of lightning. Captain Horsburg informed Sir Joseph Banks, that there was a peculiar phenomenon visible in the Indian Ocean in the rainy season. One night, when the sea was very dark, it suddenly changed to a bright flame-colour, which continued about ten minutes. It bore no resemblance to the ordinary sparkling or glowing appearance, but was an equally-diffused milky light. The cause of this seems to be satisfactorily given in some remarks communicated by a gentleman to Mr. Macartney.

Between New Holland and the coast of China, shortly after sunset, every person on board was surprised at the milky appearance of the sea. It was imagined that they were upon a reef, and that the light was caused by the coral bottom. Upon sounding, however, no bottom was found with seventy fathoms of line. This gentleman examined a bucket of water in the dark, and detected the presence of a great quantity of globular bodies about the size of a *pin's head*, joined together, and emitting pale phosphoric light. These were so transparent that they could hardly be discerned, when taken in the hand into the light. This singular appearance was visible for two evenings. So soon as the moon rose, the sea resumed its usual dark appearance. These remarks are extremely important, as tending to prove that the diffused light of the ocean is caused by the concourse of a vast number of minute medusæ near the surface. These globules were undoubtedly to be referred to the variety *Medusa scintillans*, or sparkling medusa.

There is another singular phenomenon which may be traced to the same source, and has long been a fruitful subject for the superstitious terrors of the ignorant. There are few seamen probably, who have not felt a thrill of awe, an undefinable sensation of mingled fear and wonder, on beholding, during the violence of a tempest, a pale lambent flame hovering about the summit of the mast, or the extremities of the loftiest yards. This sensation is felt by almost every nation; and each has some legend of its portent, from the volatile Frenchman, who shrugs his shoulders in helplessness, at sight of the "Feu Saint Elme," or St. Elmo's torch, and the timid Portuguese or Spaniard, who devoutly crosses himself and repeats his Ave, when the "Corpo Santo," or holy shape appears, to the hardy American or English sailor, who cries out, "Here comes one of these horrid compo-sants." Innumerable are the tales of disaster, and wreck, and death, with which its presence is commented upon, and of which, to their excited imaginations, it is the too certain harbinger. Many a fearful glance is cast aloft, and many a prayer is breathed, that nothing may occur to render their presence there necessary. Men who quailed not from the fiercest fury of the storm, and whose cheeks no certain danger could blanch, have felt their heart suddenly grow faint, and their courage fail, at the sight of this dreaded object. What a benefit would a person confer on these men, who should convince them that in the calm still evenings, they had often with delighted eyes watched this same object, floating by in its native element, clothed in light and beauty; and that it was merely the time and place which made it fearful. It is, in fact, nothing but one of the medusa tribe, which has been blown from the top of some wave, and driven along by the gale till it encountered some obstacle in its progress, to which its numerous long feelers cause it to adhere. It is to be regretted in this, as in many other cases, that those whose information is superior to that of the generality, should consider it beneath their dignity, or at least, unworthy their trouble, to dispel the false notions, and combat the prejudices of the seamen; forgetting that whatever makes men wiser, generally speaking, also makes them better. If the few brief and hasty observations here presented should prove the means of removing the shadows of error or superstition from but one single mind, the writer will much more than have received "his reward." The remarks in this article have been made not without the hope of inducing some abler and better qualified hand to take up the pen, and describe as fully as they deserve, the wonders of "the great and wide sea, wherein are things creeping innumerable, both small and great beasts."

Poverty has in large cities very different appearances. It is often concealed in splendour, and often in extravagance. It is the care of a very great part of mankind to conceal their indigence from the rest. They support themselves by temporary expedients, and every day is lost contriving for to-morrow.—Dr. Johnson.

ELIAS ASHMOLE.

ELIAS ASHMOLE'S HOUSE, LAMBETH.

ASHMOLE, a philosopher, chemist, and anti- f some eminence, was born at Litchfield in shire, May 23rd, 1617, and while yet a boy, od music so well as to become a chorister in l Cathedral. When about sixteen he was to the house of Mr. Paget, a baron of the Ex- where he spent his time in studying the law e other lighter accomplishments. In March, married Miss Eleanor Mainwaring, and in year became a solicitor in Chancery. Three terwards he became an attorney in the Court non Pleas, which was shortly followed by the his wife, to whom he was affectionately at-

the civil war commenced, his loyal principles necessary for him to leave London, and he a gentleman of the Ordnance in the garrison d, whence he removed to Winchester, where several situations of more or less importance. nterim he studied diligently at Oxford, and in st of many valuable branches of knowledge, d up a lurking attachment to astrology, which reat vogue at that time.

the affairs of the royalists became desperate, retired into Cheshire, and subsequently re- gain to London, where he became closely con- vith Lilly, and other astrologers of the time; lso bent his mind towards more valuable and studies. Being in Buckinghamshire some erwards, he formed an acquaintance with Lady ring, who had been thrice married, and was the third time a widow. Ashmole offered his Lady Mainwaring; but her son had such a o the match, that when Ashmole happened to ill, he broke into his chamber, and, if not d, would have murdered him. However, in er, 1649, they were married, and removed to , where Ashmole's house became the resort of t learned and ingenious persons that flourished ime. He shortly afterwards published a work my, and likewise a complete collection of the f such English chemists as had till then re- in MS. He engaged the most eminent en- of that period, Mr. Vaughan, to engrave the this work, and employed him in his own This work appeared in 1652, under the title *rum Chymicum Britannicum*, and acquired great on for the author as a learned man, and ed him to several distinguished individuals. as then involved in several law-suits, on of his marriage with Lady Mainwaring, which at distracted his attention from studies; but only for a time, for he directed his attention ardently towards antiquities, losing at the same time a portion of his fondness for astrology and alchemy.

His next undertaking was the collection of materials for a *History of the Order of the Garter*, a work of great labour, as he had to search for and examine documents and records, which had never before been arranged and compared with one another. When he published this work, it was received with an extraordinary degree of attention, not only from the noble and learned in England, but on the continent. Charles the Second gave him 400*l.* The book was deposited by the then pope, in the library at the Vatican. King Christiern, of Denmark, sent him a gold chain and medal, which, with the king's leave, he wore on certain high festivals. Frederick William, elector of Brandenburgh, sent him the like present, and ordered his book to be translated into high Dutch. Other foreign princes likewise testified their high approbation of the work.

About this time Ashmole resided at the house which is represented in our cut, and which was situated at South Lambeth. It formerly belonged to John Tradescant, who had collected a valuable museum. He was a Dutchman, and had travelled to various parts of the world, for the purpose of collecting plants, seeds, minerals, coins, and other rarities. He settled in England, in the reign of James the First, and his museum at Lambeth was visited by all the noble and learned persons of the time. Ashmole first lodged with Tradescant, at the house of the latter, besides having chambers in the temple; but subsequently he became the possessor of the house, and Tradescant made him the noble bequest of his whole museum, in 1659.

In 1661, Ashmole was elected F. R. S., and in the following year was made secretary of Surinam, in the West Indies; and, after filling sundry other offices, he was made Accountant General of the Excise, in 1668. His second wife dying soon after, he married the daughter of the learned Sir William Dugdale, and was in the next year made M. D., by a diploma from Brazen-nose college.

From this period, his learning, and the various offices that he filled, secured him the respect and the society of the principal persons in the kingdom. On one occasion he visited his native town of Lichfield, when the corporation got up a splendid entertainment for the reception of one who now did honour to the place of his birth.

In 1678, Ashmole suffered a great loss, which Anthony à Wood thus describes:—

His chambers in the Middle Temple were burned in the great fire there in January 1678, wherein was a library of books, the collection of thirty-three years, mostly from abroad; a collection of near 9000 coins and medals, ancient and modern, being the gathering of thirty-two years; also a large collection of ancient evidences and seals of the english nobility and gentry; all the great seals of England from the Conquest hitherto, with many of the religious houses both in England and Scotland, those of England hanging at their several instruments. He lost also there his observations upon history, coins, medals, heraldry, and some other subjects, being the effects of his studies for about thirty years, which lay there in his said chambers for improvement as he had leisure. His coins and medals of silver were all melted, and have cost him as much as the worth of them in weight, in digging among the ruins, sifting among the rubbish, and hiring the silversmiths to wash the dirt.

About the same period he made a present of the whole of his museum to the university of Oxford, and thus originated the celebrated Ashmolean Museum at that place. It was towards the latter end of October, 1677, that he made an offer to that university, of bestowing

on it all that valuable collection of the Tradescants, which was so well known to the learned world, and which had been exceedingly improved since it came into his possession, together with all the coins, medals, and manuscripts, of his own collecting, provided they would erect a building fit to receive them: to which proposition the university willingly assented. Accordingly, on Thursday, May 16th, 1679, the first stone of that stately fabric, afterwards called Ashmole's Museum, was laid, on the west side of the theatre; and being finished by the beginning of March, 1682, the collection was deposited, and the articles arranged by Dr Plot, who had before been intrusted with their custody. This museum was first publicly viewed on the 21st May following, by his Royal Highness James, Duke of York, his royal consort Josepha Maria, Princess Anne, and their attendants, and on the 24th of the same month, by the doctors and masters of the university. In a convocation, held in June, a Latin letter of thanks, written by the deputy orator, being publicly read, was sent to Mr. Ashmole, at South Lambeth. It has been remarked that Tradescant was deprived of his due share of honour, with regard to this collection; for it is Ashmole, and not Tradescant, whose name is attached to the museum.

Soon after this period, Ashmole retired from all the various offices which he had filled, and lived in dignified retirement, respected and admired by all, and offering a fostering hand to many who had not the pecuniary means necessary for developing the powers which they possessed. He died, May 18, 1692, in his seventy-sixth year, bequeathing his library, and other valuable articles, to the university of Oxford.

THE GROTTO OF ANTIPAROS*.

One of the most remarkable curiosities in the world is the Grotto of Antiparos, situated among the Greek islands, that scene of so much that is interesting to the scholar, the poet, and the antiquary.

Antiparos is one of the small islands in the Grecian Archipelago, and is situated exactly opposite to the isle of Paros, a circumstance indicated by its name. It is of an oblong shape, and about sixteen miles in circumference. There is a tolerably large village about the middle of the island, and at a small distance from the sea. The entrance to the grotto is near the summit of one of the highest hills. Having arrived at a large area, which appears as if it had been hewn out of a rock, the traveller sees before him a perpendicular face or wall, from fifteen to twenty feet high, and nearly filled with columns of stalactite. Behind these columns a passage leads to an opening through which the traveller enters, and after descending obliquely, he comes to a perpendicular descent. The mode of descent is by ropes, which on the different declivities are either held by natives, or they are joined by a cable which is fastened at the entrance around one of the stalactitic pillars. When the traveller has been let down by a rope through the perpendicular descent, another sloping path leads to another perpendicular descent. When the latter is descended, the traveller lands upon a small projection of the rock which affords footing enough to enable him, by clinging to the side of the cavern, to pass round into the principal chamber, the floor of which is tolerably level.

This chamber, cavern, or grotto, is of surpassing magnificence, and rivets the attention of the traveller. It measures upwards of two hundred and fifty feet in one direction, and three hundred in another. The roof, the floor, and the sides are entirely invested with a dazzling incrustation as white as snow. Columns, some of them twenty-five feet in length, hang like icicles from the roof; "fortunately," as Dr. Clarke observes, with just satire, "some of them are so far above the reach of the numerous travellers who, during many ages, have visited this place, that no one has been able to injure or remove them." Other columns extend from the roof to the floor, with diameters equal to that of the mast of a first-rate ship of the line. The loftiest part of the chamber is of considerable height. There is a large mass of stalactite which divides the principal chamber from the adjoining one, and which is remarkable for the lightness and variety of its tapering columns with round embossed heads, giving the place, when well lighted up, very much the appearance of a Gothic cathedral.

The mass of white stalactite, which we have described as dividing one chamber from another, has received the name of the *Altar*, from a remarkable ceremony which was performed there many years ago. The Marquis de Nointel, ambassador from Louis the Fourteenth of France to the Grand Seignior, happening to pass through the Archipelago about the season of Christmas, 1673, determined to celebrate the festival within the grotto itself. He caused it to be illuminated by one hundred large flambeaux, and four thousand lamps, which, when reflected from the white sparry crystal, must have almost exceeded in brilliancy anything that the eye ever yet witnessed. More than five hundred persons attended on this occasion, and the celebration of midnight mass (the ambassador being a Roman Catholic) was recorded in an inscription still visible on a neighbouring rock.

Magni, the traveller who first describes this grotto, gives a vivid picture of the feelings which the sight of it occasioned. He says,—

Having been informed by the natives of Paros, that in the little island of Antiparos, a gigantic statue was to be seen at the mouth of a cavern at that place, I was resolved to pay a visit to it. In pursuance of this resolution, after we had landed on the island, and walked about four miles through beautiful plains and woodlands, we at length came to a little hill, on the side of which yawned a most horrid cavern, that with its gloom at first struck us with terror, and almost repressed our curiosity. Recovering from our first surprise, however, we entered boldly, and had not proceeded above twenty paces when the supposed statue of the giant presented itself to our view. We quickly perceived, that what the ignorant natives called a giant, was nothing more than a sparry concretion, formed by the water dripping from the roof of the cave, and by degrees hardening into a figure that their fears had transformed into a monster. Incited by this extraordinary appearance, we proceeded still further, in quest of new adventures in this subterranean abode. As we advanced, new wonders offered themselves; the spars, formed into trees and shrubs, presented a kind of petrified grove, some white, some green, and all receding in due perspective. They struck us with the more amazement, as we knew them to be the mere productions of nature, who, hitherto in solitude, had in her playful moments dressed out the scene for her own amusement. But we had as yet seen but few of the wonders of the place, and we were introduced as yet into only the portico of this amazing temple. In one corner of this half-illuminated recess, there appeared an opening of about three feet wide, which seemed to lead to a place totally dark, which one of the natives assured us contained only a reservoir of water. Upon this we tried, by throwing down some stones, which rumbling along the sides of the descent for some time, the sound seemed at length quashed in a bed of water. In order, however, to be more certain, we sent in a Levantine mariner, who, by the promise of a good reward, with a flambeau in his hand, ventured into this narrow aperture. After continuing in it for about a quarter of an hour, he

* The reader will find a view of this Grotto in *Saturday Magazine*, Vol. II., p. 73, a reference to which will enable him better to understand the *additional particulars* contained in the present article.

returned, carrying some beautiful pieces of white spar in his hand, which art could neither imitate nor equal.

It may naturally be supposed that this excited the traveller's curiosity still further. The whole party ventured through the opening, each one carrying a flambeau, and all followed one another into the grand chamber. Here their attention was at once absorbed by the glittering spectacle presented to them. The roof all hung with icicles, transparent as glass, yet solid as marble,—the lofty and noble ceiling,—the sides covered with spars,—the masses assuming the forms of columns, thrones, altars, &c., formed altogether a scene which might well leave a deep impression on the mind of the traveller.

Tournefort, in his *Voyage to the Levant*, gives rather an unfavourable account of the mode and the means of getting entrance to the grotto, beautiful as the grotto itself is. He says,—

You afterwards go forward to the bottom of the cavern by a greater descent of about twenty paces long; this is the passage into the grotto, and this passage is only a very dark hole, in which you cannot walk upright, nor without the help of torches. First, you go down a frightful precipice by means of a rope, which you take care to fasten at the very entrance. From the bottom of this precipice you slide down into another much more terrible, the sides very slippery, and deep abysses on the left hand. They place a ladder aside of these abysses, and by its means we tremblingly got down a rock that was perfectly perpendicular. We continued to make our way through places somewhat less dangerous; but when we thought ourselves upon sure ground, the most frightful leap of all stopped us short, and we had infallibly broken our necks, had we not had notice and been kept back by our guides. There is still the remains of a ladder which M. de Nointel had placed there; but as it is now grown rotten, our guides had taken care to bring another brand-new. To get down here, we were forced to slide upon our backs along a great rock; and without the assistance of another rope, we had fallen down into horrible quagmires. When we were come to the bottom of the ladder, we again rolled for some time over rocks, sometimes on our backs, sometimes on our bellies, according as we found most ease. And after all these fatigues, we at length entered into that admirable grotto, which M. de Nointel had just reason to say he could never sufficiently admire.

Another traveller, after having got through about half the difficulties of the descent, thus expresses his woe :—

If I had heartily repented of my expedition before, here I was all in a cold sweat, and fairly gave myself over for lost; heartily cursing all the travellers who had visited this place, that they had described it so as to tempt people to see it; and never told us of the horrors that lay in the way. In the midst of these reflections, and in the very dismalest part of the cavern, on a sudden we had lost four of our six guides. What was my terror on this occasion! The place was a thousand times darker and more terrible for want of their torches; and I expected no other but every moment to follow them into some of these lakes, into which I doubted not but they were fallen. The remaining two guides said all they could, indeed, to cheer us up, and told us that we should see the other four again soon, and that we were near the end of our journey. I do not know what effect this might have upon the rest of my companions, but I believed no part of the speech but the last, which I expected every moment to find fulfilled in some pond or precipice. Our passage was by this time become very narrow, and we were obliged to crawl on all fours over rugged rocks; when in an instant, and in the midst of these melancholy apprehensions, I heard a little hissing noise, and found myself in utter and indescribable darkness. Our guides called indeed cheerfully to us, and told us that they had accidentally dropped their torches into a puddle of water; but that we should come to the rest of them, and they would light them again; and told us there was no danger, and that we had nothing to do but to crawl forward. I determined to lie down and die where I was. One of our guides, perceiving that I did not advance, came up to me, and, clapping his hands firmly over my eyes, dragged me a few paces forward.

The sequel is soon told. This traveller was rather too much of a coward for the exploit he had undertaken; so the guide blinded his eyes, and pulled him onwards to the grotto; then, uncovering the traveller's eyes again, the splendour of the grotto burst upon his view, and made him forget his mishaps in the transport that he felt.

But what is the origin of this crystal grotto? To this question we must devote a short space. Supposing the cavern itself to be one of those natural cavities which exist so abundantly in every part of the world, the crystalline deposit has been well accounted for by M. de Choiseul. The water which oozes through fissures in the rock, carries with it, in a state of solution, innumerable particles of calcareous matter; and when it finally escapes, in the form of drops, at the roof and sides of the cavern, the calcareous matter held in solution remains, and forms a concretion, while the water evaporates. The nucleus thus formed is continually receiving an additional coat, from fresh moisture descending as before. Like icicles hanging from rocks washed by a torrent, the stalactites grow larger and larger, still preserving the conical figure occasioned by their original mode of formation. But should the water filtrate in greater abundance from above, the drops will not have time to evaporate in their passage; they will therefore fall to the bottom of the cavern, and will there occasion calcareous concretions, extending upwards, in proportion as those from the roof extend downwards; so that in process of time their extremities will meet. Thus will a column be formed, imperfect at first, but gradually enlarging, from the same causes as first gave it birth. Such is the manner in which Choiseul accounts for the formation of the columns, and other fantastically formed masses, which are visible on every hand, as well as for the icicles hanging from the roof.

Dr. Clarke, who was a mineralogist as well as an indefatigable traveller, says that the upper surface, or summit of the mountain, is a stratum of lime-stone, inclined very considerably from the horizon; beneath this is a layer of schistus, containing the sort of marble called *cipolino:* then occurs the cavity which forms the grotto, parallel to the dipping inclination of the superior strata, and this cavity was once probably occupied by a bed of marble, succeeding in regular order to the schistus above it.

The stalactite which forms the beautiful sparry concretion of the grotto, is pure alabaster, and the known delicacy of that substance will help to furnish an idea of the dazzling richness which the grotto presents. There are two kinds of Alabaster; viz., *carbonate of lime*, of which the ancients used to make their perfume boxes and vases, and of which the Grotto of Antiparos consists; and *sulphate of lime*, which is commonly known among us by the name of *gypsum*. Carbonic acid is very frequently present in water; and when a superabundance of it is present, the fluid is capable of maintaining in solution a portion of carbonate of lime; but upon the slightest agitation, or division, or exposure to the atmospheric air, or change of temperature, the carbonic acid makes its escape, and the fluid, thus losing its solvent power, allows the lime to precipitate.

Dr. Clarke mentions it as remarkable, that these enormous stalactites, thus formed during a series of ages by the slow and gradual deposit of carbonate of lime, filtering drop by drop from the roof of the cavern, offer concentric layers only towards their surfaces; their interior structure exhibiting a completed crystallization, which separates by fracture into semi-transparent rhombs, as perfectly formed as if they

had resulted from a simultaneous, instead of a continued, process. Dr. Clarke saw, what he believes himself to have been the first who ever saw, the crystallization of alabaster. These crystals were in distinct groups on the surfaces of several of the concretions in the grotto. That these crystals were gradually accumulating in size, until they met together and constituted one mass, he conceived to be evident, because, upon a diligent examination of all parts of the grotto, he found, that where the stalactites are small, and in an incipient state, the crystals upon their surface were exceedingly minute; where they were large, the crystals were also large, some of them exceeding two inches in diameter. Another surprising circumstance is, that although the outer crust of these crystals is opaque, and similar to the exterior incrustation of the concretions themselves, the crystals, when broken, are, each and all of them, found to be parts of the stalactites upon which they have been formed.

Altogether this exquisite natural grotto affords an interesting and valuable occupation for the labour of the mineralogist, as well as pleasure to the travellers who visit it from curiosity.

RISE AND PROGRESS OF THE SILK MANUFACTURE.

III.

Improvements in Machinery.

The Throwing-mills and machinery, (already referred to), erected by Messrs. Lombe at Derby, in 1718, were the objects of the greatest admiration at the time, but have long since become obsolete, by improvements subsequently made; but in Italy they remain unchanged. Raw silk, before it can be used in weaving, must be converted by throwing into either singles, tram, or organzine. Singles is the most simple process, consisting in merely twisting the raw silk, in order to give it a firmer texture. Tram is formed by twisting together, not very closely, two or more threads, and this description most commonly forms the shoot in manufactured goods. Organzine is principally used in the work that is to form the length of the goods.

The throwing is of the nature of rope-making, where the combined strands are twisted in an opposite direction to that given to the separate threads: whereas singles and tram are twisted only in one direction, similar to twine. The thrown silk is first dyed, and that intended to form the warp, is prepared by a warper, by means of a warping-mill.

Plain-weaving.—The machine for enabling the weaver to perform his labours, has, up to very recent times, been the object of but little change or improvement. The art of weaving varies but little, whatever may be the material which is the subject of manufacture. The engine-loom is chiefly used at Coventry, also in Spitalfields. Coventry has long been the seat of the ribbon manufacture of England, employing above 10,000 looms.

Figure-weaving.—The Jacquard loom has driven other looms out of use. It was the invention of M. Jacquard, a weaver of Lyons, bearing his name. It will prove a lasting record of his mechanical talent. The elaborate specimens of brocade, which used to be brought forward as evidence of skilfulness on the part of weavers of former days, were produced by only the most skilful of the craft, who bestowed on their performance the most painful amount of labour. The most beautiful products of the loom in the *present day* are, however, accomplished by men possessing only the ordinary rate of skill, while the labour attendant upon the actual weaving is but little more than that demanded for making the plainest goods. In the course of the very few years during which the Jacquard loom has been known in England, it has been materially simplified and improved; while in Lyons, the city of its birth, it still remains unaltered, either in form or arrangement, from the original conception of its ingenious inventor.

Dr. Cartwright, during the summer of 1784, had his attention directed to weaving, and in a short time produced his first power-loom, which, though an extremely rude machine, soon received many valuable improvements; but his mill, containing five hundred looms, was wilfully burnt down in 1813. There were 2300 power-looms in the United Kingdom. Dr. Cartwright expended from 30,000*l.* to 40,000*l.*, and was compelled to abandon his manufactory. In 1808 he presented a petition to the House of Commons, and 10,000*l.* was granted, as some compensation for his outlay and disappointment.

Power-looms are more and more applied to the production of broad silks and ribbons, and will eventually drive the engine-loom out of use. It has already caused a considerable want of employment in Spitalfields. The silk-trade of Great Britain at present may be valued at 7,000,000*l.*; the importations from France through the custom-house about 500,000*l.*, and by smuggling to about 300,000*l.*; making together 800,000*l.*

The imperishable nature of silk, even under circumstances peculiarly unfavourable to the preservation of animal substances, forms one of its qualities, which is deserving of remark. Some years ago, the sexton of the parish of Falkirk, in Stirlingshire, upon opening a grave in the church-yard, found a ribbon, wrapped round the bone of an arm, and which, being washed, was found entire, and to have suffered no injury, although it had lain there more than eight years, and had been in contact with a body, which had passed through every stage of putrefaction, until it was reduced to its kindred dust.

Ingenuity of a Spider.

A large blue fly having got his legs entangled in a web, set up a terrible buzzing with its wings, but could not extricate its pinioned members. A little spider stood watching the prisoner at a distance of two inches, on a slender thread of its own weaving. As soon as the poor fly had become weary, so that its wings were still, the little assassin crept so near, that with its right hand it fastened a line on one wing, and then scampered off to the wall to make it fast. The fly, thus alarmed, again began to buz as furiously as before; but the spider never ventured near till the wings were quiet, when it cautiously crept near enough again to throw a second cord over the wing, which was fastened, as in the first instance, to the ceiling. Thus, by little and little, and patiently waiting for opportunities, both wings were completely bound down with those almost invisible lines. Being conscious that the fly was now completely within its power, the cruel spider boldly seized upon the body of its captive, to feed leisurely upon its vitals: but a spectator, overcome by his sympathies for the wretched insect, crushed the spider into an impalpable powder. He now attempted the liberation of the fly; in doing which he not only tore off several of its legs, but so injured the membrane of the wings as to render a repair impossible. His compassion obliged him to kill the poor fly also.

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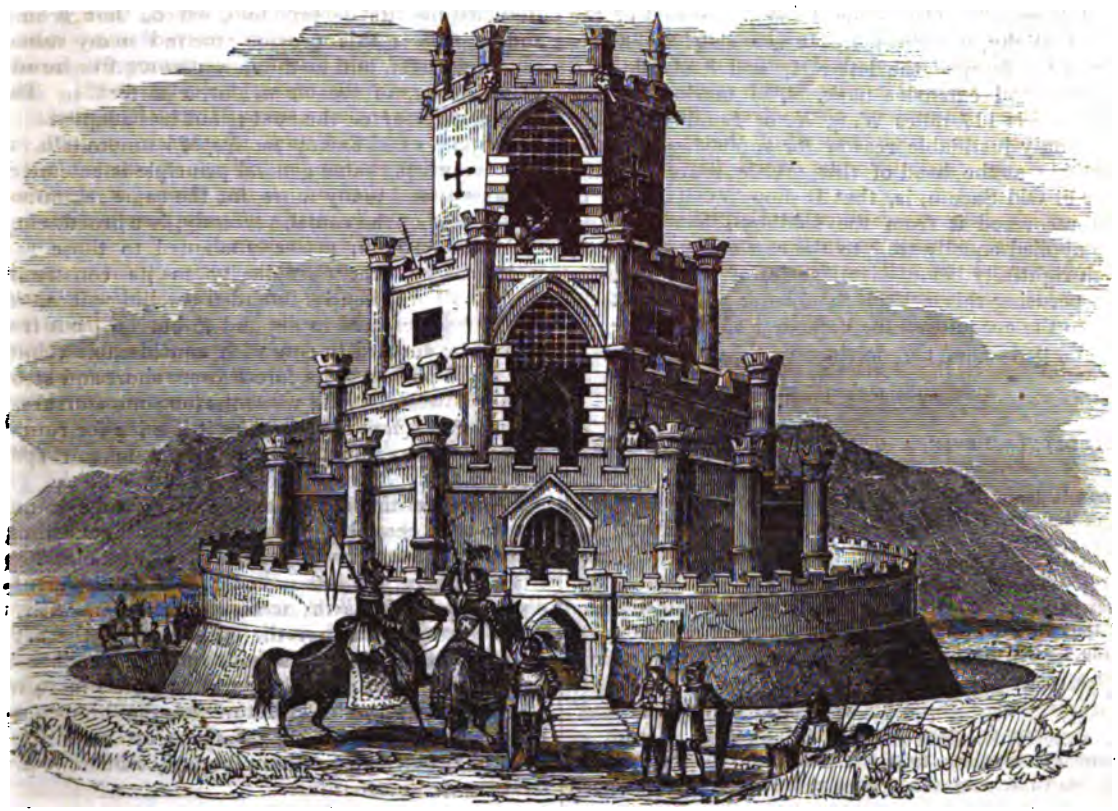
CASTLE OF SHERBORNE, DORSETSHIRE.



CASTLE OF SHERBORNE, IN THE FOURTEENTH CENTURY.

In this work there have been given, at intervals, accounts of some of the oldest and most reputable castles of England, and we here resume the subject by offering to the reader's notice a few details respecting the CASTLE of Sherborne, which has been often confounded with that of Old Sarum. We left off describing the CITY of Old Sarum at p. 155; but first, we must refer the reader to the general description of Ancient Castles, given at Vol. III., p. 27, of this Magazine.

The castle, of which a view is given in the frontispiece, has been commonly considered to be that of Old Sarum, as it existed in the reign of King Stephen, at the beginning of the twelfth century. The view is derived from an old picture, which was most probably taken from the representation in brass on the ground of the morning chapel in the north aisle of the cathedral of Salisbury. Here, over the grave of Bishop Wyvil, is this castle, with the figure of a bishop in an arch over the portal, and a warrior standing at it, armed with a shield and a battle-axe.

Rabbit warrens existed near the place, as indicated by the rabbits near the castle. Round the edge of the stone, in old English characters, is a Latin inscription, of which the following is a translation, as far as it is legible:—

Here lies Robert Wyvil, who collected and preserved his flock as a vigilant pastor. Among many other benefits to his church, he recovered the castle of Sherborne* from the violent and unjust occupation of the military (after it had been in their hands several years) like an undaunted champion, and procured the restitution of the forest of Bere to his church. He, on the 4th day of September, 1375, and in the forty-fifth year of his consecration, as it pleased the Most High, paid the debt of nature in the said castle.

Now, by referring to the article on Old Sarum, p. 153 of this volume, we see that the cathedral of the Hill-city had been removed before Bishop Wyvil's death, and that Old Sarum was rapidly decaying. Bishop Wyvil is, therefore, not likely to have remained at Old Sarum, and resided till his death in the castle, which place the clergy had deserted because of their dissensions with the military occupants of the castle; and besides this, the style of architecture shown above, does not belong to the flourishing era of Old Sarum, but is of a later date.

Sherborne was anciently part of the diocese of the Bishop of Salisbury; as also it has been again made in our own times. Sherborne is in Dorsetshire, and has near it the site of an old castle. In the year 705 it was made a bishop's see; but the see was translated in the reign of William the Conqueror to Old Sarum. The castle stood upon an eminence, half a mile from the town, in a suburb still called *Castleton*. It is supposed to have been first erected in Saxon times.

* In the original *Schireborne*.

but soon after the Conquest this castle was annexed to the bishopric of Salisbury. We hear nothing further of it until the times of the civil wars in King Charles's reign, when, after having stood out for a long time in favour of the royalists, it was at length taken, after a siege of sixteen days, by Cromwell and Fairfax. A great quantity of ammunition, provisions, plate, &c., was found here, and many distinguished prisoners were taken. The parliament soon after ordered the castle to be demolished, which was immediately done, and but few vestiges of it now exist. With a portion of the materials, the mansion now called Sherborne Castle, or Lodge, the seat of the Earl of Digby, was erected. It is a singular edifice, built in the form of the letter H, and it stands in a beautiful and extensive park. The market-town of Sherborne is 117 miles W. S. W. of London.

The only justifiable reason for supposing that the engraving at the head of this article represents the tower of Old Sarum, is, that Bishop Wyvil is said to have recovered it from the soldiery; but this may have applied equally well to the castle of Sherborne, which rightfully belonged to the see of Salisbury.

In perusing this article, the reader will do well to refer to the account of the cathedral of Salisbury, at Vol. V., p. 154, of this work.

MEDITATIONS IN A GARDEN, UPON A SPRING MORNING.

THERE is something in the opening of the dawn at this season of the year, that enlivens the mind with a sort of cheerful seriousness of its existence. For my own part, at least, the rising of the sun has the same effect upon me, as it is said to have had on the celebrated statue of Memnon; and I never observe that glorious luminary breaking out upon me, that I do not find myself harmonised for the whole day. While I was enjoying the freshness and tranquillity of this early season, and considering the many reasons I had to join in offering up that morning incense, which the poet (Milton) represents as particularly arising at this hour, "from the earth's great altar," I could not but esteem it as a principal blessing, that I was entering upon a new day with health and spirits. To awake with recruited vigour for the transactions of life, is a mercy so generally dispensed that it passes, like the ordinary bounties of Providence, without making its due impression. Yet, were one never to rise under these happy circumstances, without reflecting what numbers there are, who, (to use the language of the most pathetic authors,) when they said, "my bed shall comfort me, my couch shall ease my complaint," were, like him, "full of tossings to and fro, unto the dawning of the day;" or "scared with dreams and terrified through visions;" were one to consider, I say, how many pass their nights in all the horrors of a disturbed imagination, or all the wakefulness of real pains, one could not find one's self exempt from such uneasy slumbers, or such terrible vigils, without double satisfaction and gratitude. There is nothing, indeed, contributes more to render a man contented with that draught of life which is poured out to himself, than thus to reflect on those more bitter ingredients, which are sometimes mingled in the cup of others.—MELMOTH.

I love to rise ere gleams the lovely light,
Winter's pale dawn; and as warm fires illume
And cheerful tapers shine around the room,
Through misty windows bend my musing sight,
Where, round the dusky lawn, the mansions white,
With shutters closed, peer faintly through the gloom,
That slow recedes; while yon gay spires assume,
Rising from their dark pile, an added height,
By indistinctness given, then to decrease
The grateful thoughts to God, e'er they unfold
To friendship or the muse, or seek with glee
Wisdom's rich page! Oh hours more worth than gold,
By whose bless'd use we lengthen life, and, free
From drear decays of age, outlive the old.

MISS SEWARD.

ON THE FEET OF ANIMALS.

THERE is no obvious reason, at first sight, for the great difference between the foot of a horse and an ox; but when we examine their separate destinations, the perfect adaptation of each construction becomes apparent. The horse was intended for hard ground and rapid movements; and the hoof is constructed accordingly, answering its end, perfectly in the state of nature, and serving that purpose under domestication also, better than is generally believed. The place of the ox was to be in meadow lands, and in river banks—its destiny to tread on soft grounds; and equally is this provided for in the divided and spreading hoof, and in the dew claws. A horse sinks, where an ox, of greater weight, can feed in safety. The sharp hoof of the goat is not less adapted for the rocky places and narrow footing of its mountain habitation; and the same general principle is extended to the sheep, and many more, for the same reason.

The foot of the camel, reversely, is a broad, elastic, and soft cushion, perfectly adapted to those sands which every other peculiarity in its construction shows to have been its intended dwelling-place. The rabbit was destined to dig and to burrow; but it was also to be enabled to run with considerable velocity. For these purposes, its fore-legs are short and strong, with a powerful hand; while the long metatarsal bone is rendered a foot to rest on, as it is a leg for running. It can thus compress itself into a narrow space; while the length of the lever behind, and the great flexibility of the spine, enable it to take a much longer step than its size would indicate, and thus to contest with the speed of its far larger enemies.

In the hare, the intention to afford concealment by crouching, leads to the same construction, with the same effect; as in all the quadrupeds, the art of running, as far as force is concerned, depends solely on the hind legs; the others forming little more than a resting-place. The structure of the hind-foot in the kangaroo, and its congeners, is an extension of the same contrivance, with a somewhat different practical result.

Where digging without running was required, we find the singularly beautiful hand of the mole. The legs are all extremely short; because longer ones would have been inconvenient, as well as useless; but there is a peculiarly shaped humerus, with a flat and long carpal bone, which, while the hand is enlarged in breadth, allows the palm to be turned outwards.

It is an unexpected extension of the mechanism of the mole's hand, to find it adopted in so very different a department of creation as it is in its application to the mole cricket; yet under a variation which renders it a much more complex machine, well deserving examination.

The contrivance in the foot of a cat is oftener seen than remarked: the wants of the animal demanded a hand to seize, like the eagle; and this was to be combined with a foot for walking. Superficially viewed, the foot of the cat and dog are similar, and both walk on the ends of their toes. But though the dog's foot had been more flexible than it is, the wearing down of the claws by walking, would have prevented it from securing an object. To protect those, in the other animal, the last joint of each toe is reversed, when the foot is at rest or used for walking; being brought forward with its long claw, when used as a hand for seizing, and returned to its place, by an elastic ligament. In the lion, the same object is effected, but in a different manner, by means of a lateral motion, which, like the peculiar form of the last phalanx in this tribe, does not well admit of

description. Here too, as in all animals of similar strong claws, we find a peculiar contrivance for fixing these organs firmly in their sockets; a projection from it entering within the claw, while that is embraced externally in the usual manner.

In the cat also, ordained to prey by surprise on animals of very quick hearing and rapid movements, the sole of the foot is peculiarly soft; whence, united to the extraordinary flexibility of the whole body, that inaudible, stealing step, so well known; while in the marten, the same object is attained by covering it with hair.

The rat and the mouse can walk, without difficulty, on surfaces not horizontal, by means of the sharpness of their claws, united to their great strength and small weight. The walrus, equally ponderous and inactive, is compelled to clamber over inclined and smooth rocks, in quitting the sea; and this object is attained by constructing the sole of the foot in such a manner that it can produce a vacuum with the surface. But the interest attached to this contrivance is increased, by observing how it is varied in different animals, under the general principle. In the walrus, where the toes must have existed, the muscles enable them to form a vacuum, as it can be imperfectly done in the human hand: in the foot of the gekko, each toe has transverse cavities, opening by slits below, which can be rendered vacuums by muscular action; but in the fly, which can thus walk on glass, against gravity, there are cushions, conforming to the general structure of insects, producing the same effect; as in the *Bufo calamita* it is attained by means of tubercles, and, in different lizards, by cushions or scales.

The feet of birds offer a more complete general view of a regular system of variations applied to one principle of construction, and every one of these distinctly adapted to the particular destination or desire of the animals.

If the most general purpose is that of walking on ordinary ground, so is the basis of this contrivance familiar in the domestic fowl, and in many other birds. But a considerable change is made, when it becomes necessary to climb trees, as in the woodpecker, and more. In these cases, two of the claws, instead of one, are directed backwards, and thus a support in this difficult position is obtained; while the foot of the parrot thus becomes a hand also. And the power of turning the outer toe backward or forward appears intended to give equal facility in roosting and in seizing; while we see the utility of this double power very strikingly in the owl. The talons of the falcon tribe are rendered hands, by furnishing the toes with long and curved claws. In the swimming birds, these are so connected by the web, that they become paddles, and thus are enabled to perform a double office. And in this case there is an evident intention to save muscular power; since the simple flexion of the heel joint is the only exertion required, the paddle shutting and opening by the mere pressure of the water. In the semipalmated birds, there is an interesting variation of this subsidiary contrivance. It is a sufficient paddle in the coot and the water-hen, while it also assists them in walking on soft bogs, and is not interfered with by asperities, as the entire webbed foot might be.

The length of leg, and the barrenness above the hock joint, in the wading birds, is a variation for the sake of those which do not require to swim, or could not, because their prey lies in shallow waters. If the heron is a familiar example, I must also point out that serrature in the claws, which enables it to grasp its slippery and active prey. It is a contrast to the bow-legged waders to find the ptarmigan feathered, even over the feet; while the utility is equally seen in the habitation which it has been ordered to choose for itself among the snow. It is not a contrivance, but a peculiar application, to find that the sea-birds which lay without a nest, on smooth rocks, use the foot as a hand, to retain their single egg, in rising, lest their long wings should sweep it into the sea.

In the lobster and crab, considering these as insects, the hands, which serve as feet also, are well known. He who should examine the former, would decide that the two were meant for different uses; nor would he easily substitute a more efficacious piece of mechanism for that one which is used for cracking shell fish, as the other is designed to tear flesh. Smaller and finer hands or pincers are allotted to other kinds, as they often also are found in many of the feet, though amid the species of this extensive tribe we do not often conjecture the uses. And in some of them, a pair of feet, or more, are flattened, so as to resemble lancets; thus serving the purpose of swimming fins, as well as of feet for walking beneath the sea.

In the proper insects, the purposes served by the feet are very multifarious, and often exceedingly particular. Among these are, walking on a great variety of substances and surfaces, often under the more appropriate terms of climbing and jumping; such as land, under all its forms; above the water and beneath it; water itself; smooth or polished planes of many kinds; leaves of all sorts and in all positions, at rest or in motion; fibres or hairs, which must be embraced by the foot; and even their own spun webs. Thus also are they hands for seizing prey, in many different ways, for spinning, for digging, or for building, plastering, and more in those which execute peculiar works. In all these cases, the constructions are equally various and perfect for their uses: the adaptations conformable to the destinations. As a few examples I may point out the brushes on the feet of flies, where the intention is decidedly marked, by their limitation to those which can be used as hands; the comb-shaped feet of the spider, intended for separating the threads in spinning; those of the louse, designed for clasping a single hair; and the not very dissimilar one of the grasshopper, applied to the very different purpose of picking up ants as it walks among them, while placing them in its mouth at every step, without any apparent effort, or even intention. Looking at the great length of the legs, in the well-known fly which receives its common name from this circumstance, it would seem impossible that it should make its way among the long grass which it inhabits: yet that construction has been adopted for this very purpose, with a peculiar additional variation, departing also from a very general rule, through which the tarsus is formed of a great number of joints, enabling it to bend round and to embrace those narrow leaves.

* * * * * *

A considerate and consistent design has been planned by One Mind, and executed by One Hand.

[Abridged from MACCULLOCH's *Proofs and Illustrations of the Attributes of God.*]

As when the sun approaches towards the gates of the morning, he first opens a little eye of heaven and sends away the spirits of darkness, gives light to the cock, and calls up the lark to matins, and by and by gilds the fringes of a cloud, and peeps over the eastern hills, thrusting out his golden horns; and still, (while a man tells the story,) the sun gets up higher, till he shows a fair face and a full light. —JEREMY TAYLOR.

EMIGRATION TO NEW SOUTH WALES.

To depart from home and form a separate dwelling, is a natural condition to which the members of every large family must at some time look forward; so upon an extended scale will it continually happen to members of a prosperous community. The industrious bee, whose habits serve as a model for human conduct, periodically sends out her offspring: when the hive is full, the young swarm issues forth, diverting its flight not wholly by inclination, but by the fitness of the place for future settlement—be that place near or distant.

In early times, emigration could only have been what the word now signifies in its simplest meaning, namely, the going forth to live beyond the limits of the place where the person emigrating had been accustomed to dwell,—a departure from a first home,—an exchange of dwelling. So that when the inhabitants of some village, or any portion of them, crossed, it may have been, the neighbouring hills, to possess themselves of another valley, they were as truly emigrants as those, who, in modern times, traverse the ocean to settle in a distant country. The word has no relation to any particular class of society, but as everywhere shepherds, ploughmen, gardeners, and other husbandmen, with carpenters, smiths, masons, and the like, outnumber the other classes, there is the same necessity for its being so amongst emigrants. Like the terms *soldier* or *sailor*, *emigrant* and *colonist* are general terms, that include men of every condition.

Thus *colonist*, in the language whence the word has been taken, signifies a tiller of the ground, as well as the inhabitant of an infant state. And no doubt founders of colonies have, for the most part, been of the class of tillers of the ground; although the term is now applied generally, as well to the entire society, as to the place of settlement itself. Persons who emigrate to colonies do not necessarily change their condition, any more than had they gone to dwell in some neighbouring village. The true object in emigrating is to obtain more of the necessaries and conveniences of life, than are to be had at home, for the same amount of labour or of money. The becoming, therefore, and being considered an emigrant, neither adds to nor takes from the respectability of any one. If those who become emigrants have not quitted their country without due consideration; if they are exemplary in their conduct, and have besides some knowledge of the place of intended settlement, from the good report of friends who have gone before them, there is reasonable ground to expect that they will not only benefit themselves and their families, but be of more real service to their country than had they continued at home; particularly when the place of emigration is an off-branch of their own nation.

The position of such persons may be aptly illustrated by a tradition of an eastern family, which, after encountering many perils, arrived in an unknown land: for dangers seem wisely interposed, that none may lightly, or without due reason change the country of their birth; and few but such as are in some measure prepared to aid themselves. After landing on the nearest shore, this family made a wide circuit through a woodland district, abounding in pastures, and many things most pleasing to the eye; but, excepting a few wild berries, there was little wherewithal to live, for the birds and wild animals were few, or too wary to be entrapped. Worn out at length with fatigue, hunger, and disappointment, the strangers set themselves down, wholly dispirited. But unexpectedly, a female of benign aspect kindly greeting them, presented them with a crook, a hatchet, and a hoe, and as suddenly disappeared. Taking council together, they had wit to discover the hidden meaning, conveyed by the gift of these simple implements, the symbols of rural industry. They returned to their little bark, brought with them, on again landing, sheep, horses, and cattle, with grain, and all kinds of seed; and striving to deserve support from heaven by their own willing exertions, each began cheerfully to labour, according to his strength or ability.

Their sheep and cattle rapidly multiplied; the first rudely constructed huts gave place in time to commodious habitations; and the soil, which in the beginning seemed reluctant to afford them a bare subsistence, yielded at length corn, and wine, and oil, with a rich harvest of many fruits; or, as is more beautifully expressed in the Psalms,

"Food out of the earth, and wine that maketh glad the heart of man; and oil to make him a cheerful countenance, and bread to strengthen man's heart."

The flocks of sheep, (for truth no longer needs the dress of fable,) which covered the land, became famed in distant countries for their wool, and gave a positive value to wild pastures. With the prospect of turning them to account, there now repair to Australia individuals, whose wealth enables them to buy the unoccupied land. The funds from this source have rapidly increased; and by their aid, ships are sent by Government from different parts of the United Kingdom, in which a free passage is offered to useful labouring people and mechanics*.

In cases where colonial proprietors themselves have been enabled to superintend the outfit, emigrants are accommodated, as shown in the plan of a ship given in the annexed table. It will be seen that every family has a separate cabin; with a sleeping berth or berths. If there are in the family more than one child, a separate berth and bedding are provided; and when there are several children they have separate cabins. Single men, or boys of more than ten years of age, sleep in hammocks, in the open space between the cabins, which married men have also the means of doing†.

The bedding provided is of better description than persons of this class usually possess, and is intended not only for the voyage, but to serve in their dwellings on shore. Each cabin has a ventilator, three and a half inches in diameter, to which a glass or bull's-eye is fitted, and is removable at pleasure, for the admission of fresh air. All the bedding and utensils are numbered according to the cabins, and a list is put up in each cabin of the several articles in it. The bedding is daily taken upon deck, where in bad weather it is covered up, as in ships of war.

The utensils are of a very substantial kind, because they are not to be replaced at sea. The space occupied by the emigrants is for their exclusive use, and no other persons are permitted to sleep therein. They are required to take no part in the ordinary duties of the ship, except to assist in washing decks, and are subject to no molestation in passing the line, or during any part of the voyage.

Their provisions are issued daily in proportionate quantities, and cooked for them. A printed scale is hung up in the cabin, that every one may see to how much he is entitled. Excepting in cases of sickness, or at the request of the surgeon, neither wine nor spirits are allowed; but of tea and sugar there is an ample allowance.

Materials are supplied for their occupation at sea. Bagging and twine for the men, and shirting for the women; and the better to stimulate them to industry, the same prices are given for work as on shore. The value may be taken out in linen, or in little additional comforts, as coffee, flour, raisins. Thus many families, who embark with a scanty supply, are enabled to provide themselves with an excellent stock of apparel; for out of every seven shirts made up by the women, they may retain two; and out of every four shifts, have one. The children also, by imitating the industry of their parents, in making up shirting or coloured prints, are enabled to clothe themselves.

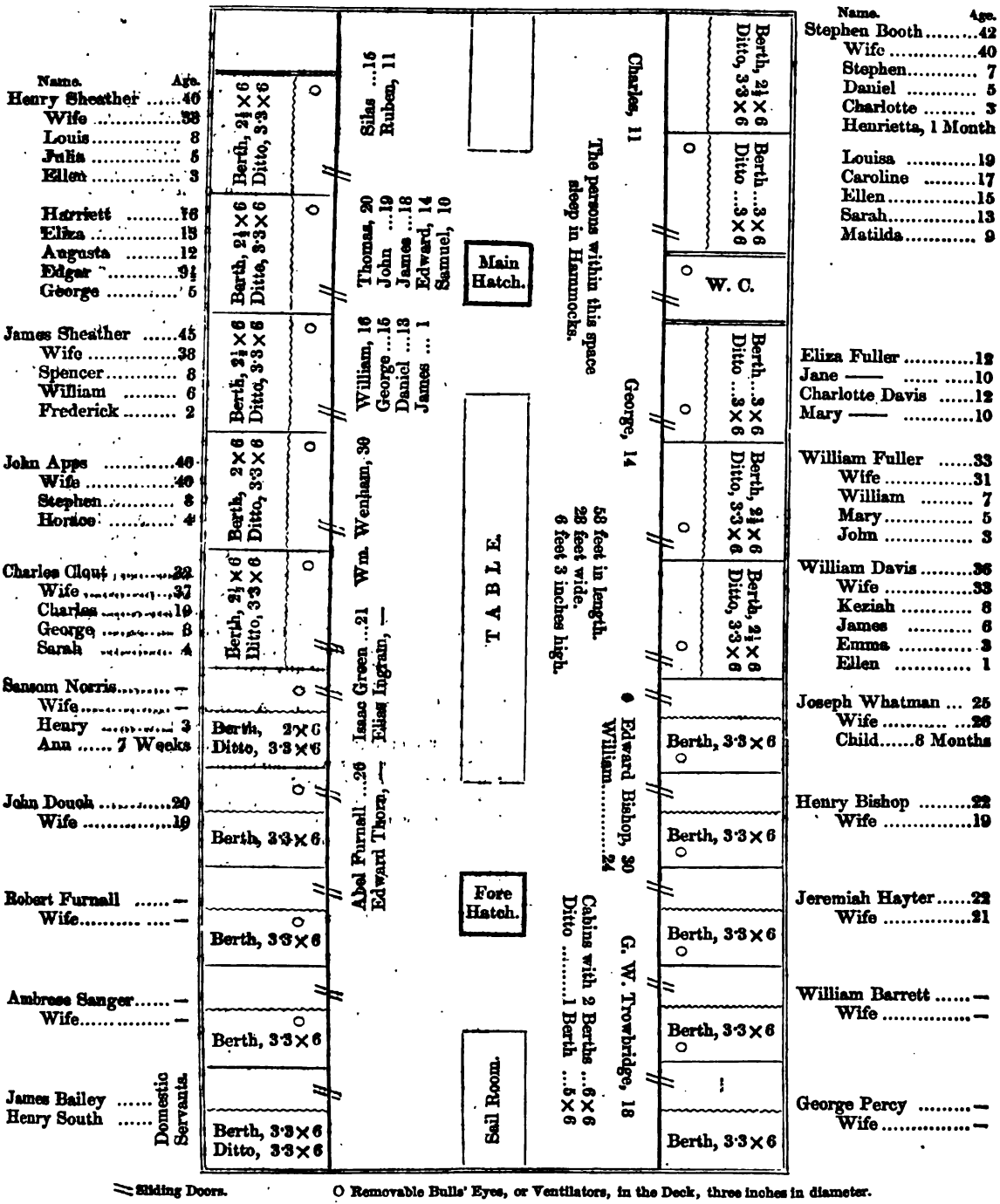
Divine service is performed every Sunday, and books are provided for their mental, moral, and religious instruction; as well as a school for the children during the voyage. All assemble daily for family prayer, a book of which is given to each person.

The voyage from London to Sydney generally occupies from fifteen to eighteen weeks, during which time the vessel traverses a space of about sixteen thousand miles. Serious as such an undertaking may seem, yet the excellence of the vessels, and the abundant store of provisions and water with which they are provided, compensate in some respect for the length of the way. Contrasted with the passage to America, its advantages are greatly in favour of the emigrant to Australia, because, from the comparative shortness of the voyage, there is, in the ordinary ships which sail for America, much less of preparation for the comfort and accommodation of the emigrants. By reason, therefore, of the superior preparations for so long a voyage as that to New Holland, which are completed before leaving England, and the fineness of the weather usually experienced by the way, the whole passage to Sydney is generally performed with ease and comfort, and, in almost every case, with perfect safety.

* By the unremitting attention of the officer entrusted with this important department, the conveying emigrants to Sydney is gradually becoming a well-regulated system, worthy at once of the energies and benevolence of Englishmen.

† It would, no doubt, contribute to the maintenance of good order, if none but children were permitted to sleep in the open space between the cabins.

PLAN of Steerage-Cabins on board the ROYAL GEORGE,—G. RICHARDS, Master,—for a Party of Agricultural Labourers going to Sydney, October 31, 1838.



= Sliding Doors. O Removable Bulls' Eyes, or Ventilators, in the Deck, three inches in diameter.

BEDDING AND UTENSILS IN EACH CABIN.

	s.	d.
1 Mattress for every Berth or Sleeping-place	11	6
1 Pair of Blankets	12	6
1 Counterpane	4	1
1 Canvass Valise	3	0
1 Green-painted Slop-pail and Cover	3	0
Hooked Pots according to the size of the Family .....each from 1s. 6d. to	2	6

	s.	d.
2 Mess-dishes each Cabin .....each	1	2
1 Round Tin Pan each Person	0	7
1 Porringer Ditto	0	4
1 Tea-canister and Sugar-box each Family	1	4
1 Large and small Spoon each Person	0	5
1 Knife and Fork	1	0
1 Lantern each Cabin	3	6

	s.	d.
1 Large Sponge	2	0
1 Washing-tub	4	0
1 Hand Ditto	2	0
1 Water-keg	4	2
1 Bread-bag	0	9
3 lbs. of Marine Soap and 3 lbs. of Yellow Ditto, each Family	4	1½

Each article bearing the Number of the Cabin.—Each Family's Name over the Door.—Inventory in each Cabin of the Furniture within it. Padlocks, saps, and iron clothes'-pins to each Cabin.

SCALE OF PROVISIONS.

Children, 2 to 4 Years of Age, One-fourth.—Ditto, 4 to 8 Ditto, One-half.—Ditto, 8 to 14 Ditto, Two-thirds.

Bread .....14 lbs.	Pork ..... 3½ lbs.	Peas ..... 1½ pints.	Sugar ..... 2 lbs.	Suet ..... 4 ounces.	Oatmeal .... 4 pints.
Beef .....5½ lbs.	Flour ..... 4 lbs.	Tea ..... 7 ounces.	Rice ..... 1 lb.	Raisins..... 1 lb.	Water .....42 quarts.

For Fourteen Days; to be issued in daily proportionate quantities, according to a printed Scale, hung up in a conspicuous place.

When circumstances admit of fresh Beef being issued, each person above Fourteen Years of Age receives 10 ounces of Beef, 1 lb. of Potatoes, and 1 lb. of Biscuit, with Flour and Raisins for a Pudding on Sundays. Tea and Sugar according to the Scale.

The Cost may be stated at £18 for each Adult, and a proportionate sum for Children under Fourteen Years of Age.

Upon the arrival of the party at Sydney, the principal town and port in the colony, they go to an estate, about forty miles distant, and communicating with it by a good road.

The district, like many others of the colony, is, to a great extent, under cultivation; abounds in all the necessaries of life; and is enlivened by sheep, horses, and cattle depasturing over it. The emigrant families form, within themselves, the nucleus of a rural community, and are independent of other persons for society.

There are two churches in adjoining parishes, each about five miles distant, and both of the established English Church. Once in the month the clergyman of one of them performs divine service on the estate itself, where an additional church is building. Indeed, active measures are in progress throughout the colony, to provide schools and places of worship.

The heads of each family have a cottage, with a plot of garden ground, rent free; the milk of a cow, or permission to depasture a cow, upon the adjoining land; to keep pigs and poultry sufficient for their own use; and receive from fifteen to twenty pounds per annum wages, with an allowance of seven pounds of meat, and eleven pounds of flour weekly. Each married woman receives half this quantity of provisions for the first six months.

Upon first arriving, these families are placed in cottages, built of the bark of the Eucalyptus, (or gum tree); the floors being of brick, the walls whitened within, and the rooms proportioned in number to the size of the families. Such temporary habitations are usual in the colony, and are very comfortable for two or three years. Eleven of these families, by the last accounts, were living in permanent cottages, which are gradually being built for the entire number. These last are either of brick or rammed earth, (Pisé,) and the value of each pair of cottages, with garden-fences and appurtenances, is about a hundred and ten pounds. Each cottage contains a kitchen, thirteen feet square, bed room, nine feet by thirteen, one or two lean-to rooms, seven feet by eight, and a small pantry or closet. They are neatly plastered within, and glazed, and in front have a verandah.

A school is formed for the children, and occupation found them upon the estate, according to their age and capacity. These families are, however, at liberty to seek other employment, on making good the difference between such bounty as may be received from government and the cost of their outfit and passage. The difference in no case exceeds fifteen pounds, although the various articles in the list of equipments become the property of the emigrant on going on board the ship. Out of the fifteen pounds, five pounds are remitted for every year's service, it being found that conditions binding the servant to any one employer, frequently create the restlessness and disposition to change which they are intended to counteract.

At the termination of five years, if they wish it, they are to be settled as tenants upon fertile land, within a short distance of some market; and are to pay rent either in produce or labour.

Equally advantageous terms are to be obtained generally throughout the colony of New South Wales. The vessels, on board which these parties embark, are of about five hundred tons burden, with a general cargo, and other passengers, having a surgeon and an experienced commander.

There have been sent to the same estate, and upon the same plan; fourteen families from the county of Dorset, embarked in November 1836; also six families of Germans, from the vineyards of Markobrunner, on the Rhine, consisting of six married men with their wives, and fifteen children; being twenty-seven souls. In the month of May, 1838, twelve other families from Dorsetshire, being forty-two souls; and in the following November, a fourth party, consisting of ninety-two Kent and Dorsetshire people, making in the four parties, two hundred and eighteen souls. Of the last party, accounts have yet been received from the Cape of Good Hope only, when there had been an addition of four infants to the number; but all the others had safely arrived at Sydney, and happily without any accident*.

The emigrant on arriving there will readily find an occupation and a dwelling, amongst numerous colonial proprietors, who wish to afford the means of settlement upon their estates, to frugal and industrious families, whose early habits of industry enable them to labour with ease and cheerfulness, and who strive besides to uphold the virtuous habits and religious observances of the mother country.

They will find also in this colony, good high roads, frequented by coaches, carriages, and wagons, by sleek and lusty teams of horses or of oxen, and by men whose happy mien gives evidence of their easy condition. There poverty, in the sense in which in parts of the United Kingdom it is too bitterly felt and understood, is wholly unknown. Every husbandman is gladdened by abundance of all the necessaries and not a few of the conveniences of life. For so excellent is its climate that his hand is rarely stayed by frost, or snow, or the rigours of winter. Its productive soil yields every grain and vegetable useful to man, with fruit in the highest perfection. Apples and oranges, pears and lemons, plums and citrons, cherries and melons, apricots and figs, with grapes and peaches, are seen in the same garden. Green peas are gathered in Winter and Summer; and the potatoe produces two crops in the year.

Occasionally, however, this course of prosperity is severely checked by seasons of extreme drought; yet with all these drawbacks, the following table showing the progressive increase of its revenue and staple exports will show how rapid have been the stages of its advancement.

Revenue.

1824 ...	£49,191	1831 ...	£117,447
1825 ...	65,733	1832 ...	122,163
1826 ...	69,478	1833 ...	138,469
1827 ...	75,495	1834 ...	161,960
1828 ...	91,306	1835 ...	184,268
1829 ...	99,475	1836 ...	198,129
1830 ...	102,743	1837 ...	226,900

Exports of Wool.

1824 ...	275,560 lbs.	1831 ...	1,134,134 lbs.
1825 ...	411,000	1832 ...	1,425,657
1826 ...	552,960	1833 ...	1,969,668
1827 ...	320,683	1834 ...	2,225,823
1828 ...	967,814	1835 ...	2,688,440
1829 ...	913,322	1836 ...	3,008,022
1830 ...	973,330	1837 ...	4,606,915

So much for the advantages of this colony as a field of emigration, for which all the other settlements in Australia will in time possess similar inducements.

Many moral evils have arisen from New South Wales having been established as a penal settlement; but it is due to the mass of unfortunate men who have been sent thither for their offences to state, that many have taken to good and industrious courses, and that not a few of their children have gained that influence in the colony which character, education, and property, will always ensure. As a body they have made some atonement to their country for past misconduct, by having prepared the way for another class of persons. The access to this colony is now so easy to men of every condition, and the advantages it holds out so many, that the time cannot be distant when its population will possess the average good character of the people of other countries. Within a few years, indeed, since the commencement of free emigration to it, the general aspect of society is greatly changed, attributable in a great measure to the number of respectable persons arrived on its shores; bringing with them the moral restrictions and principles of their native land; thus infusing life through the body of the population. The number of ministers who have also arrived, have tended in a remarkable manner to a change, which is converting the land to a land of the living. Another cause is the establishment of schools for youth; until within a few years a great proportion of the inhabitants were wholly given up to matters connected with their daily existence; but at present there is the same devotion to the cultivation of religious principles and moral duties that is witnessed in other countries.

The great object in drawing attention to these facts is, to point out the resources in store for the exertions of honest labour; that men of benevolent minds may consider how these attempts at systematic emigration may be improved; and whether, if conducted upon sound principles, they may not be the means of opening still wider to the poor a channel, by which, in seasons of distress, they may pass from a state of hard and necessitous servitude, to one of comfort, and eventually of independence.

It may be interesting to political economists to know, that a population of 10,000 persons, natives of Great Britain, consume more British manufactures, than 50,000 persons of any other race.

* In too many cases the decks of private ships are so encumbered with casks and sheep pens, that it is difficult to obtain space and opportunity for the children to play or to carry on the school provided for them.

MATERIALS FOR THE TOILETTE.

No. IV.

A Looking-Glass.—(*Concluded.*)

In our last article on this subject, we endeavoured to give a brief account of the optical principles on which a looking-glass acts, and of the philosophy of that familiar occupation, "looking at one's self in the glass." We will now proceed to describe the manufacture of the glass.

Whatever may be the varieties of glass, whether the coarse green glass of which wine bottles are made, the brilliant cut glass for table service, the glass of our windows, or that which forms the looking-glass of the toilette, they all resemble one another in being made of silex, or flint, and an alkali, either soda or potash. Silex and alkalies, when fused, or melted together, form the transparent substance which we call glass, and minor circumstances fix the various qualities of different kinds of glass.

We will suppose our dressing-glass to be made of plate glass, which is the best fitted for this purpose. The ingredients employed for the glass are sea-sand, soda, lime, nitre, and broken plate-glass. We have said that flint is one of the ingredients in glass; but it must be remembered that sea-sand is flint, ground or worn down to the size of small grains by the action of the sea. The best sand has been hitherto obtained from the port of Lynn, in Norfolk, and from Alum Bay, in the Isle of Wight; and sand has even been brought from New South Wales to England, on account of its excellence for the purposes of glass making.

The sand, soda, nitre, and broken glass, being chosen in certain proportions, are put into a melting pot, and exposed to a fierce heat. A very high and long continued temperature (about forty hours) is necessary for the complete melting and mixing of the ingredients, and also to enable a sort of scum, called *sandiver*, to rise to the surface, from which it is skimmed off. If the melting is properly performed, the whole mass becomes fluid, and perfectly colourless.

When perfectly melted, the glass is emptied, by means of a copper ladle, from the melting pot, into a large vessel, called a *cuvette*, which has been strongly heated before the glass is poured into it. The temperature to which the workmen are exposed in this process is scarcely conceivable to persons unacquainted with the details of manufactures: it is most intense.

When the cuvette is filled, it is left some hours in the furnace, in order that the air may be extricated and dissipated from it. When this is done, the cuvette is taken out of the furnace, and removed to the casting-table, and suspended over one end of the table, by means of a crane: the table is higher at one end than the other, and the cuvette is placed over the higher end. The cuvette is then tilted over, and the contents flow out upon the casting-table, running down from one end to the other. The edges or sides of the table have two raised ledges, to prevent the glass from flowing over; and, in order to render it perfectly flat in every direction, a metallic roller is passed over the surface of the melted glass, from end to end,—the roller being removed to a small height above the surface of the table by two raised ledges, one on each side. By these means the surface of the glass is rendered perfectly flat, and cools in that form.

During these processes the utmost silence is preserved in the manufactory. About twenty men are employed in the casting, and they move about with great caution,—keeping the doors and windows closed, and admitting no one but those actually engaged in the casting. The object of this precaution is, to cause as little agitation in the air as possible, as the surface of the melted glass would be otherwise liable to be rippled or furrowed with a kind of waves.

The casting table is placed with one end near the mouth of an annealing oven; and as soon as the glass which is upon it has become solid, it is carefully slipped from the surface of the table to the floor of the annealing oven. The table is removed to its place, and another glass, or sheet of glass, is made in a similar manner, and then slipped into the oven. This process is repeated until the oven contains as many glasses as it is calculated to hold; after which the door is closed, and carefully stopped with clay or cement, to prevent the admission of air. In this oven they are kept for about a fortnight,—the temperature being allowed gradually to cool in the mean time; after which, the oven is opened, and the glasses taken out.

The sheets are then cut to a square form by means of a glazier's diamond, and prepared for polishing. In order to effect this last-mentioned process, the glass is laid on a table, and imbedded in plaster of Paris. Powdered flint is then sprinkled on the glass, and another large glass is moved steadily and regularly over the surface of the lower one, by means of machinery; so that the powdered sand which is between the two glasses, grinds one surface of each glass at the same time.

When a certain degree of grinding is thus effected by fine sand, a coating of coarse emery powder is substituted for it; and the grinding continued. This is again replaced by emery of a finer grain, as the process proceeds towards completion. The surface is now perfectly smooth, and free from irregularities; but it is dull, or deficient in gloss, and has therefore to undergo the process of *polishing*. For this purpose the plate of glass is firmly fixed upon a large table, and rubbed over for a long period with polishing instruments. These used to be moved by manual labour; but now the polishing, as well as the grinding, is done by steam machinery. The polishers are blocks of wood, covered with many folds of woollen cloth, having carded wool between the folds. On these blocks is sprinkled a substance called *colcothal*, which is an oxide of iron; and they are then worked over the surface of the glass, until it becomes perfectly polished, and as free as possible from blemishes of every description. When one side is polished in this manner, the glass is turned over, and the other side similarly treated.

By this means, then, is a large sheet of glass produced, and when we say that glasses twelve feet long by eight feet wide have been made, all in one piece, uniformly thick in every part, it may serve to convey some idea of the extreme care necessary in making. The high price which is charged for plate-glass does not arise so much from the costliness of the materials, or from the duty imposed upon it, as upon the great labour and risk bestowed upon its preparation. It often happens, that after a sheet of glass has been cast, annealed for a fortnight in the oven, ground, and polished, it is then discovered that there are blemishes in it which unfit it for sale, and it is thrown again into the melting-pot; for it is not until the glass is polished that its defects, as well as its beauties, are properly brought to view.

As breakages frequently occur with so brittle a substance as glass, the broken pieces are used for dressing glasses, and other purposes for which small pieces will suffice; and when these have been cut and squared to the proper proportion, they are handed over to the *silverer*, to give them that metallic coating

at the back, which fits them to act as mirrors or looking-glasses. In No. 403 of the *Saturday Magazine* (vol. xiii., p. 144) we gave an account of the mode of silvering looking glasses; we shall here therefore confine ourselves to a few remarks not contained in that article.

Mercury, being a fluid, would not adhere to glass without the co-operation of some other substance which will convert it into a solid. Such a substance is found in *tin-foil*, which is a very thin sheet of tin. When a drop of mercury is placed on this substance, the two rapidly combine, and produce an amalgam, which adheres pretty firmly to glass. By a due regard to this circumstance, and a perusal of the article to which we have just referred, a correct idea may be obtained of the principle by which a piece of transparent glass is transformed into a mirror or looking glass.

This remarkable substance mercury, with which one side of the glass is coated, is brought principally from two places; viz., from Idria, in the Austrian dominions, and from Almaden, in Spain. In vol. xiii., p. 135, of the *Saturday Magazine*, will be found an account of a visit to the quicksilver mines at Idria. That article will give a pretty general opinion of the mode in which the metal is obtained; and a few remarks thereon, as well as on the mines at Almaden, in Spain, will suffice for the present article.

At Idria, a horizontal passage, hewn in a solid rock, leads to a flight of 757 steps, cut in lime-stone rock, which lead down to a kind of aisle, which serves as a chapel for the miners. From this aisle various avenues lead in all directions to the working parts of the mine, from which from 15,000 to 18,000 cwt. of quicksilver are drawn annually.

At Almaden, in Spain, are quicksilver mines which have been known and worked for more than two thousand years. The galley slaves, who work in these mines, are occupied about three hours in each day in carrying out the ore which contains the quicksilver, in wheel-barrows. It is said that some of them pretend to be in convulsions, and others in fits, in order to excite the compassion of those who visit the mines. The inhabitants will work willingly double the time, and receive only half of what every slave costs the government. But all the labourers suffer dreadfully from the effects of the mercury. These victims of a deplorable mismanagement (the hired labourers) are described as being a laborious, simple-minded, virtuous race of beings, who are condemned to breathe an atmosphere impregnated, far and near, with the fumes of a volatile poison, which the resources of science might easily repress, with the effect of not only protecting the health of the population, but of vastly augmenting the revenues of the state.

This mine has been a source of great wealth to two brothers, named Mark and Christopher Fuggar. They undertook, rather more than two centuries ago, to work the mine, and to furnish the government with about half a million pounds weight of quicksilver every year, on condition of having all they could find beyond that quantity. They accumulated great riches, but after a time they found the mine less productive, and then ceased to work it; after which the government took the management of it into their own hands.

The quicksilver is not found in the metallic state, but in an ore called *cinnabar*, from which it is extracted by means of heat, and then exported in iron bottles.

Such, then, are the two principal materials in a looking-glass; viz., the glass itself, and the mercury with which it is coated. Into the decorative parts of the dressing-glass we need not enter. These are of various forms, according to the purposes to which they are to be applied, whether to stand on the toilette table, or to be fixed up in any other way. In most instances the frames which hold them are made of mahogany, and the manufacture of them is a species of carpenter's, or rather cabinet-maker's work, which does not call for particular remark.

INFLUENCE OF RELIGION ON POETRY.

IT has been remarked by an American writer, whose opinions are sometimes not less admirable than his eloquence, that religion surpasses every other principle in giving freedom and variety to the human intellect; recognising in every faculty the workmanship of God, and assigning to each its appropriate sphere of agency. Religion, he justly regards, as of all principles the most fruitful, multiform, and unlimited; possessing both the fertility and the munificence of nature. Genius rises in renewed radiance from the hallowing waters of Jordan.

"But," says Johnson, "the topics of devotion are few, and being few are universally known; but few as they are, they can be made no more, they can receive no grace from novelty of sentiment, and very little from novelty of expression." But the fountains of human feeling are not so soon exhausted; and every one who is familiar with the treasures of English theology, will be enabled to refute the assertion of Johnson. Our topics of devotion may be numbered by our necessities; and he, at least, who through various obstacles, and many sufferings, and griping penury, had climbed into public notice by the energy of his character and the favour of Providence, ought surely to have reflected upon his own obligations, and to have acknowledged that his own topics of devotion could never be few. Gratitude for mercies, resignation under chastisement, supplication for forgiveness, are only variations of the same great duty. To the fancy of the poet, above all, nothing can be entirely exhausted of its beauty and life: by the rays of his own invention he draws forth new colours and lustre. Homer beheld the moonshine upon the shield of Achilles, and Sidney watched her going astray through the sky, and Virgil lighted up with her beams the face of the little Iulus in the tumultuous streets of Troy; and Landor beheld her reflection upon the wet sand of the sea-shore, like the shadow from "jasper column half upreared;" yet Wordsworth, in one of his latest poems, has presented her under a different aspect, and shown us that the springs of poetry can only be dried up with the heart of man.

The most beautiful refutation of Johnson's theory, however, has been afforded by the *Christian Year* of Mr. Keble, in which every day of the Christian's life furnishes a theme to the poet. The Hymns of Heber, if enlarged to the original outline, might have been united with a volume which breathes the ardour of Ken, without his conceits, and the meekness of Herbert, without his harshness; which illustrates the saying of Crashaw, that the wounded is the wounding heart, and makes the reader feel, because the author has felt before him.——WILLMOTT'S *Lives of Sacred Poets.*

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THE CLYDE AND CLYDESDALE.

FALLS OF THE CLYDE, AT CORRA LYNN.

NE of the most beautiful districts in Scotland is the alley along which the river Clyde flows, from Lead ills to the Firth of Clyde. Many of the scenes in r Walter Scott's works refer to this district, and apart to it a new interest arising from the magic of is pen; while the position of Glasgow on the banks f the river, and of Paisley at no great distance from , give to the river a commercial importance, indeendent of its natural beauties. We will take a rapid iew of the district through which the Clyde flows.

The Clyde rises in a mountainous district in markshire, a district which likewise gives birth to he rivers Tweed and Annan, all three rivers falling nto different seas. The hills from whence the Clyde prings are very lofty, and one of them is celebrated r its steepness.

One of the insurgents of 1745, (says Mr. Chambers,) hom the troops of the Duke of Cumberland were conucting to Carlisle, on reaching this place, threw himself om his horse, and before his guards could prevent him, lled headlong down the steep and fearful descent. Many uots were fired, rather after than at him, by the soldiers, ho could not venture to follow; but the poor fellow escaped nhurt, and the judicial shambles of Carlisle had one life ss to answer for.

The Clyde shortly afterwards receives the river Glengonar, on the banks of which a small quantity of gold dust has been occasionally found, but not sufficient to pay for the establishment of mining operations. At the head of one of the streams which flow into the Clyde, is situated the village of Leadhills, inhabited chiefly by miners. The lead-mines, from which the village takes its name, are the property of the Earl of Hopetown, and yield at present about seven hundred tons of lead annually, being less than half the quantity produced during the last war. They are worked by a company, who pay the earl, by way of rent, one-sixth of the property which the mines produce. Allan Ramsay the poet, was born at Leadhills.

The Clyde, by the accession of other mountain-streams, gradually becomes a considerable river; and near its banks, in the parish of Lamington, is an elevated spot called the *Hill of Tinto*, which commands an extensive view of the surrounding country. Near this place are the ruins of an ancient castle called Fat-lips Castle. The history of this building is instructive, as illustrating the inveterate nature of highland feuds some centuries back. It was built by the laird of Symington, as a place from whence he might observe the movements of the laird of

Lamington, who was his next neighbour, and with whom he had a deadly feud. He was accustomed to say that the laird of Lamington would not be able so much as to water his horses at the Clyde, or even to appear out of doors for much simpler purposes, without being overlooked and watched by him, the laird of Symington. This system of watching became so irksome to the laird of Lamington, that he left his house, and built himself a tower called Windygates, behind the hill, and out of view of his enemy.

On proceeding along the Clyde, the next village approached is *Biggar*, whose name has given rise to a Scotch joke that "though London is a big town, Scotland has a Biggar." Among the traditionary tales of Scotland is one relating to the wonderful doings of Michael Scott, the wizard. He is said to have had three familiar spirits, Prig, Prim, and Pricker, who were constantly tormenting him unless he kept them busily employed. One of the jobs he gave them was to cleave Eildon hill into three; another was to border the Tweed with a curb of stone; and a third was to twist ropes out of sea-sand. On another occasion he had planned building a bridge over the Clyde at Covington.

He had set an extraordinary number of imps to this extraordinary and public-spirited piece of work; and they were all busy carrying stones from the Yelpin Craigs, a place about four miles north of the river, beyond Carnwarth, for the purpose of immediately afterwards proceeding to the architectural part of their duty, when the joyful intelligence was communicated to them, that their master had suddenly died. Finding themselves thus relieved from their engagement, the whole train, without a moment's hesitation, threw down the stones which they were carrying; and the said stones may still be seen encumbering the fields in a line between the Yelpin Craigs and a particular point upon the river near Covington, though one or two of the farmers have of late years, at a considerable expense, cleared them off from their arable grounds. The stones are from three to three hundred weight, and the line may be an acre or two in breadth.—CHAMBERS.

How often do we find an ignorant peasantry attributing to supernatural agency the performance of that of which the real authors are unknown.

It is said that near Covington, the Clyde is so tortuous in its course, and moves so slowly, that if a straw or a piece of paper is put into the river, it will take seven hours to reach a spot which is only four miles distant by land. At a more advanced part of its banks, are the ruins of Cowdailly Castle, the seat of the noble house of Somerville, and rendered memorable by the frequent visits of the kings James the Fourth, Fifth, and Sixth, of Scotland. The last of these monarchs, on an occasion when Lord Somerville entertained him at the castle, observed that the place was appropriately named, since there was certainly a *cow*, in addition to several *sheep*, consumed *daily*.

At the village of Carnwarth there is, in the churchyard, an epitaph on a poor man named Thompson, whose son showed a degree of filial affection rarely equalled. The account is given by Mr. Chambers in his *Picture of Scotland*, a work which we cordially recommend to the reader.

Thompson was a peaceable old man, who used to manufacture various culinary articles out of straw and broom, which he sold to his humble neighbours in Newbigging. One summer night, as he was preparing to go to rest, he was called to the door by two men, who, on his appearing, stabbed him to the heart, and immediately made off. He was found two minutes afterwards by his family lying dead upon the threshold. Every effort was made by the proper authorities to discover the murderers, but without effect. His son then resolved to make a personal search. Alone *and on foot* he wandered over all Scotland, and the most of England, besides a portion of the continent, making ceaseless and anxious inquiries for the objects of his search, and mixing in every sort of low society, not even excepting that of highway-robbers and pickpockets, in the hope of obtaining at least some information respecting them. At last he came home spent and disappointed, and settled in his native village, where, however, his mind continued to ponder incessantly upon the painful and exciting subject that had so long occupied it. One night, after he had retired to rest, his waking ears were met by a low mysterious voice, that seemed to come to him, through the silence, from another world, and whispered the words "Arise and search." He rose instantly, put on his clothes, and, when day appeared, rather by a random impulse than any feasible motive, bent his steps towards Edinburgh. It had been his custom, during his travels, to visit all criminals under sentence of death that he could hear of, and sometimes even to make forced marches for that purpose. His first inquiry at Edinburgh procured him the intelligence that two gypsies were to be hanged on the succeeding day. He immediately made interest for admission to the cell of the condemned men; who, after a little conversation, confessed, that, actuated by a jealousy concerning the humble pursuits of the old man, which had interfered grievously with their own trade, they had been tempted to become his murderers. Fully satisfied with this intelligence, and the punishment which was to overtake them next day, Thompson returned home, and settled down as the schoolmaster of Walton, the parish adjoining to Carnwarth, where he died about sixteen years ago.

Those of our readers who do not believe in supernatural warnings, will probably attribute the "Arise and search," to the creation of an excited imagination.

From Carnwarth, the Clyde bends round in a westerly direction, and passes by the town of Lanark, near which the celebrated Falls of Clyde occur. Two of these falls are at the eastward, and one at the westward, of Lanark. Before the river approaches these falls, it moves very slowly, and gives but few indications of the approaching depression in its bed. The first fall is at Bonniton Lynn, where the water has a perpendicular descent of about thirty feet; and immediately below this, the course of the water becomes prodigiously rapid. At one point in this part of its course, it struggles through a chasm of not more than four feet wide, which can be stepped over.

At about half a mile from the Bonniton Lynn, is the *Corra Lynn*, the most beautiful of the falls of the Clyde, and the one which is represented in our frontispiece. Here the river, forming two separate falls of upwards of eighty feet, rushes with impetuous force into a deep abyss, and with an incessant and overpowering noise. On every side, the course of the river is environed with rocks of a great height, of the most romantic forms, and covered with trees of every diversity of foliage. Upon the summit of one of the highest, and directly above the upper fall, stands the ruinous castle of *Corra*, formerly the residence of one of the Somervilles. The rushing of the stream—the dashing of its waters from rock to rock—the thundering noise occasioned by these concussions—the height of the rocks—the ivy-clad and mouldering castle of *Corra*—and the clouds of mist rising majestically from the abyss below—form altogether a scene unrivalled in the island, and surpassed by few in any other situation.

The last fall, that of *Stonebyres*, is about two miles below Lanark, and consists of three successive falls, over which the whole body of the river rushes into a deep chasm below. Its height is sixty-four feet. The deafening noise, the lofty rocks which arise on every side, the variegated copse-wood which covers their summits, and the effect produced from the union of the whole, renders this cataract a scene of great beauty and interest.

About half a mile from the scene represented in our frontispiece, is the establishment of New Lanark.

It was built by Mr. Dale in 1785, and afterwards came into the possession of Mr. Owen. The opinions of that person, upon many subjects, are notoriously offensive, but it cannot be denied that he has done much for the cause of education at New Lanark. The village, in fact, consists of an immense cotton manufactory, and dwellings for the workers, about a thousand in number. No boys or girls are employed until they can read, write, and understand accounts, and they are educated by the proprietor of the mills. We need not here enter into the peculiar features of the system, which are not likely to be of a permanent character.

Proceeding onward from the falls and New Lanark, the tourist arrives at Lesmahogo, the church of the priory of which, together with a number of persons who had taken refuge in it, was burned by a younger brother of Edward the Third, in the wars for the succession to the Scottish throne. The incendiary, who was a very young man, immediately afterwards proceeding northward to join his royal brother, found him at the high altar of St. John's Church at Perth, where, on recounting his exploit, Edward, unable to restrain his indignation, and regardless of the sacred character of the place, gave him a blow which laid him dead before the altar.

A little further down the Clyde, the tourist arrives at Cartlane Crags, a spot of much picturesque beauty, in which a small cave in the rock is pointed out by tradition as having been the hiding-place of Sir William Wallace, after he had slain Hesilrig; and at some distance from thence stands Craignothan Castle, which is supposed to have furnished Scott with his Tillietudlem, in *Old Mortality*.

As the Clyde flows onwards towards its mouth, the country becomes exceedingly beautiful and fruitful. Mr. Chambers states, that the product of single orchards have been let, *growing*, to the retailers at Glasgow, for 600*l*. The town of Hamilton, containing about seven thousand inhabitants, and a splendid palace of the Duke of Hamilton, is then met with; and a little further on is that of Strathaven, in which is situated a castle celebrated for many important events in bygone times. The Duchess of Hamilton was deprived of the castle and her estate by Cromwell, and was supported for ten years by a faithful domestic, who earned bread for both of them by spinning.

Bothwell Bridge, another spot celebrated in Scottish story, soon after meets the tourist's eye; and various other places at last conduct him to the great city of Glasgow, the second in point of population in Great Britain, and exceeded in that respect by only eight cities in the whole of Europe. Here we must leave the reader: we have conducted him into the heart of commercial enterprise, and must not venture, at the end of a small article, to enter upon a description of such a place as Glasgow. We can only observe that the Clyde, after passing Rutheylen and Glasgow, widens near Renfrew, and still more at Dumbarton, Port Glasgow, and Greenock, where it falls into the Firth of Clyde, after having collected the waters from twelve hundred square miles of country.

Love of Justice.—A sense of justice should be the foundation of all our social qualities. In our most early intercourse with the world, and even in our most youthful amusements, no unfairness should be found. That sacred rule of doing all things to others, according as we wish they would do unto us, should be engraved on our minds. For this end, we should impress ourselves with a deep sense of the original and natural equality of man.—Dr. Blair.

SECRET TRIBUNALS;

THE VEHM GERICHTE, OR SECRET TRIBUNALS OF WESTPHALIA.

In a country like England, where justice is administered openly,—where the accuser is confronted with the accused,—where a person is deemed innocent of a crime until he has been proved to be guilty,—where he is allowed to bring witnesses in support of the defence which he may make,—where the judge is totally distinct from the accuser,—and where the decision of the tribunal is publicly announced,—we can scarcely conceive the nature of a secret tribunal, allowing no accused party to bring witnesses for his defence, and condemning and executing him in a mysterious manner! Yet such was said to be the case in the *Vehm Gerichte*, or secret tribunal of Westphalia, some centuries ago. We propose to give a brief account of this formidable association. And this we are more willing to do, because novelists and romance writers have done injustice to the *Vehm Gerichte*, by painting it in blacker colours than the investigations of historians have found it to deserve.

Neither the name nor the origin of this tribunal have been satisfactorily accounted for. There are many ways of constructing German words, all of which are sounded like *Vehm*, and it is doubtful which of those is the most correct, or is the one from whence the term was derived. Instead of dwelling on this point we will proceed to detail the causes which have been supposed to have originated the *Vehm Gerichte*.

The country now called Westphalia, is much smaller than what was known by that name in former days; and, instead of being a kingdom by itself, it formed part of Saxony, which was governed by a king. After the destruction or dismemberment of the empire of Charlemagne, Germany was much distracted by the contests of ambitious nobles; and, on the death of one of the kings of Saxony, called Henry the Lion, Saxony was divided piece-meal among several claimants. A period of great anarchy then sprung up: the people scarcely knowing whom they were to obey, obeyed no one, and life and property became insecure. It is believed that this was one of the circumstances that gave rise to the *Vehm Gerichte*,—a tribunal of which the members bound themselves by oath to act in concert, and to keep the secrets of the tribunal inviolate. Their professed object seems to have been at first, to establish a summary court of justice for the trial of offences, as the state of the country did not admit of the formal process of the law. But it was soon carried to an extravagant extent.

Whatever was the object of the tribunal, it soon acquired vast power, and a settled form. The emperor was considered as the head; next to him in authority was the Archbishop of Cologne; and under him were tribunal lords, each of whom presided over a tribunal established in his particular district; so that the whole of Westphalia was thus parcelled out, and placed under tribunals. The chief judge of a tribunal was called the *Count*, and it was general, though not universal, that the tribunal lord was also the count of the tribunal which was in his district. When the count took office, he made an oath of obedience to the emperor, and of a determination to judge impartially, and to go annually to an assemblage of all the counts, to render a report of his proceedings.

Next to the count were the *Schöppen* or *Assessors*, who formed the main body of the tribunal. To obtain this office, two persons already initiated were to swear that the individual possessed the requisite qualifications; among which were, that he should be a German, and of the Christian religion. The schöppen

were divided into two classes, in order to try criminals of different ranks; and they were also divided into *Ignorants* and *Vehmenotes*, the first being those who had only recently entered, and the latter being those who had become possessed of the secrets of the tribunal. These secrets he swore to keep from wife, child, father, mother, and all living beings; and likewise swore to bring before the tribunal all persons whatever whom he believed to be guilty of crimes of which the tribunal was cognizant. Princes and nobles were anxious to have some of their dependants among the number of the assessors, which at one time exceeded one hundred thousand.

Those who were initiated were bound to go through the country to detect evil-doers. They might go on horseback or on foot, for no one dared to molest them. Such was the tenacity with which they adhered to their oath of secrecy, that it has been said there is no instance on record of an initiated assessor breaking it. The punishment awarded was dreadful: he was to be seized, a cloth bound over his eyes, his hands tied behind his back, and a halter put about his neck; he was then to be thrown on his face, his tongue pulled out from behind, by the nape of his neck; and he was then to be hung seven feet higher than any other felon.

There were two kinds of tribunals held,—one open and public, the other secret. The public meeting was held three or four times a year, and every householder was bound to attend and state what crimes he knew or suspected to have been committed by any one within the jurisdiction. The tribunals originally took cognizance of offences against the Christian faith, the holy gospel, the ten commandments, the public peace, and private honour. But they ultimately took almost every kind of crime under their judicial care.

When a person was accused of any crime, and cited to appear before one of the tribunals, if he disobeyed, he was outlawed, and the initiated of the whole body of tribunals were bound to attempt to capture him; in fact, a hundred thousand persons were in pursuit of him by different stratagems, and any one of the number could demand the assistance of others. When the unhappy criminal was seized, he was hanged, without a moment's delay, on the nearest tree; the very circumstance of not appearing at the tribunal, when cited, being a sufficient crime to be punished with instant death. If the pursued party were uninitiated, he had no means of knowing when or how he should be captured, for the oath of the assessors prevented them from giving warning even to their dearest friends. If any person assisted the outlaw, he became involved in the punishment.

There were different ways of bringing a charge against an individual. One was where he was caught in the act of committing the offence. Another was, where he was denounced by one of the initiated as a criminal: the evidence against him was tried, without his being cited to appear, or to defend himself, and if found guilty he was outlawed, and his name written in the "bloody book," by which he was sentenced to death by the first assessor who could capture him: this was called the *inquisitorial* mode of procedure. A milder mode, called the *accusatorial*, was at other times adopted, in which the accused was cited to confront his accusers: this was always the case when the accused party was one of the initiated.

When a charge was brought, the first inquiry was, whether it was brought to the right tribunal; the next procedure was to cite the accused to appear. The summons was served upon him by assessors, *and if he did not appear* within six weeks, he was again summoned: at the expiration of another six weeks he was summoned a third time; and if he neglected to attend to this, the matter was transferred from an open to a secret tribunal. If he were uninitiated, the summons was served on him only once.

We have said that if the accused failed to appear, he was outlawed; but if he appeared, a process of trial ensued. If he were willing to appear, but were prevented by accidental circumstances, the court made liberal allowance for them in their treatment of the accused.

On the day of trial, each party was allowed to bring thirty witnesses, and also to employ an attorney, who must be one of the initiated; and a peer or equal of his client. The accusation was brought in a formal manner, and the accused was called upon for his defence. Originally the tribunals consisted of men of such a high character, that if an initiated was charged, and swore by the saints that he was innocent, he was acquitted. But this oath became in time abused, and all parties had to make a formal defence to a charge. Where clear evidence could not be obtained, the matter was decided by the comparative number of persons who would swear to the truth of the statements of the accuser and of the accused.

When the evidence was gone over, and all the parties heard, one of the assessors found the verdict. If the verdict was a capital one, the count who presided flung a halter which was near him out of the enclosure, the assessor spat on it, and the name of the criminal was entered on the blood-book. If he were present, he was instantly hung on the nearest tree, by one of the youngest assessors: if he were not present, he was outlawed,—an almost certain forerunner of his being hanged. In some cases the condemned party had the right of appeal to the secret meeting of the grand body.

Now, in the details which we have here given, there is, mixed up with much that will excite dread, a certain appearance of even-handed justice which we cannot but approve; except in those dreadful instances where a person of low degree could be sworn against by one of the initiated, tried without being present, and outlawed without knowing it. In other respects, there was considerable pains taken to judge rightly between man and man. But the extraordinary nature of the tribunal has given rise to ill-grounded opinions respecting its proceedings. Novelists have been fond of describing it as meeting in the dead of the night, and in subterranean apartments; but sober historians have found that there is not the least ground for such an opinion. It was a rigorous tribunal, but not altogether unsuited to the state of the times.

But the tribunal afterwards became an instrument in the hands of designing men, by the admission of improper persons; who were admitted without scrutiny, by the payment of a sufficient sum of money. The tribunal increased its power, but gradually lost its reputation, as an impartial court of justice; and when commerce and industry brought Germany into a more settled state, it was found that social order might be preserved without having recourse to secret tribunals.

Gentleness is a sort of mild atmosphere; and it enters into a child's soul, like the sunshine into the rose-bud, slowly but surely expanding it into beauty and vigour.—Mrs. Child.

A spirit of revenge is one of those evil passions to which our nature is most prone, and, with respect to which, we should therefore most anxiously guard against the influences of example and of habit.—Mrs. Child.

RECREATIONS IN NATURAL PHILOSOPHY.

No. XIV.

On the Elasticity of Air (*concluded*).

In our last article we stated the law which regulates the elasticity of aëriform bodies: we come now to offer a few practical illustrations of this property of one of the most beautiful and extensively useful of the Almighty's productions—the atmospheric air.

Most of the fountains which adorn the gardens of the opulent, or form such agreeable and healthful ornaments to many of the continental cities, depend chiefly for their action upon the elasticity of air. The principle of the fountain may be well illustrated by means of a very simple apparatus given in fig. 1, which however requires an air-pump to show its action. A small narrow-mouthed vessel is half filled with water: an air-tight cap is attached firmly to the mouth of the vessel; through this cap a tube (not shown in the figure) passes to the bottom of the water: this tube has a very small exterior opening. When the vessel is placed on the table of the air-pump, and covered with a tall glass receiver from which the air is to be pumped; the air contained within the vessel of water having its adjoining and counterbalancing pressure removed, expands, and exerts such a pressure upon the surface of the water as to cause this latter to dart up the tube, and escape through the small aperture, in the form of a *jet d'eau* as shown in the figure.

Fig. 1.

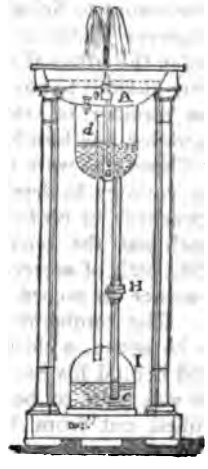
Fig. 2 represents what is called the *intermittent fountain*. This apparatus consists of a hollow sphere of glass E, closed at the top by means of a stopple fitting accurately in the neck: and at bottom by means of a copper socket, around which are pierced several orifices. This socket is fixed, and is contained within another socket which is moveable about the first. The exterior socket is furnished with apertures, in which are fixed capillary tubes, bending downwards, through which the water flows down on either side, as seen in the figure. When the apertures in the two sockets coincide, the water from the glass sphere or balloon can flow out; but when the outer socket is turned a short space round upon the inner one, the water no longer flows. Through the centre of the fixed socket is a tube open at both ends; the upper end rises near to the top of the sphere, and the lower end opens to the top of the cylinder T; this latter being supported by the cistern P. At the lower part of this cylinder is a lateral opening *a*; and in the cistern is a socket which serves to support the apparatus.

Fig. 2.

In order to set this fountain in action, the external socket at the upper part is moved, so as to intercept any communication between the bent tubes and the interior of the sphere, which is now to be filled with water, and the glass stopple carefully inserted so as to make it air-tight. The socket is next turned, in order to make the respective apertures in the two sockets coincide: the liquid flows through the capillary tubes and falls into the basin below; there it soon rises above the aperture at *a*, and thus cuts off the entrance of air into the balloon, and stops the flow of water from the capillary tubes, which however remain full on account of capillarity, and prevent the entrance of air up them. But the basin in the cistern P is also pierced with a small hole; so that the water flows into the cistern. The aperture at *a* becomes again exposed, more air ascends into the balloon, and the water again flows from the capillary tubes. Thus occurs a series of periodical downward jets, which continue until the water in the balloon is exhausted; and hence the use of the term *intermittent*.

In figure 3 we have a section of *Hero's* Fountain*. It consists of two close vessels A I. A tube A *c*, open at both ends, having its funnel at the top, passes through the uppermost vessel without communicating with it, being soldered to its top and bottom. It passes through the top of the under vessel where it is also soldered, and reaches almost to the bottom. There is also another tube *d*, which is soldered into the top of the under vessel and the bottom of the upper vessel, and reaches almost to its top. A third tube *a* is soldered into the top of the upper vessel and extends almost to its bottom: this tube is open at both ends; but the upper orifice, which serves for the jet, is very small, and can be closed entirely by means of a stop-cock. If the upper vessel be about half filled with water, the jet orifice being closed, and water being also poured into the tube at A, it will descend through A H, and compress the air which before entirely filled the vessel I, the tube *d*, and the space above the water in the upper vessel. There will, therefore, be a pressure exerted in every part of the air, so that the surface of the water in the upper vessel will have to sustain part of the pressure, and if we now open the jet orifice, the fluid will spout up and form a fountain. So long as the end of the tube *a* is below the surface of the water in the upper vessel, the jet will continue to play, because the water of the jet falls into the lower vessel through the pipe A H.

Fig. 3.



Another very pretty arrangement is shown in fig. 4. The vessel A B is divided into three compartments by the partitions F E, and H. In the partition F E are inserted two tubes, one of which L M communicates with the bottom of the compartment G B and with the bottom of the under compartment; while the other tube K I connects the upper part of the lowest compartment with the upper part of H F. A third tube N O is fixed in the cover A B extending from near the bottom of H F, and rising from the tapering bore to a point a little above O, through the middle of the vessel R S intended to receive the water which falls from the jet. The figure of a bird with its bill immersed in the water in the basin R S is placed on one side, and through its body passes a siphon Q P, the lower branch of which goes into the compartment B G.

Fig. 4.

When the two upper compartments are nearly filled up to a little below K with water, through two apertures for that purpose; and when these apertures are shut, it is obvious that, L M being open, the water will descend through it, and occupying the under compartment, will drive the air up through the pipe K I, and compress the air contained in the cavity H F. This condensed air pressing on the surface H K of the

* Hero was a celebrated mathematician among the ancients, and flourished about 100 years B. C.

water, will raise it in the tube N O, and cause it to be projected upwards in a jet d' eau. The water from the jet, after being carried to a height due to the pressure which is afforded, will fall down into the vessel S R: but, as the water escapes from the compartment B G down the pipe L M, the air in that compartment will be rarified, and will therefore not be sufficient to balance the pressure of the exterior air upon the surface of the water S R. This unbalanced pressure will therefore force the water up the siphon Q P, through which all the water in the vessel S R will be conveyed into the cavity B G, as if it had been drunk up by the bird. This fountain forms a very elegant ornament in the conservatory or green-house.

A curious example of the elasticity of the air is frequently shown by the lecturer on Pneumatics. At the broad end of an egg is a cavity, between the shell and the white. The white and the yolk are contained in a thin membrane, or bladder, which adheres loosely to the shell, but is detached from it at that part; and this cavity becomes larger by keeping the egg in a dry place. We may form an estimate of its size, and therefore of the freshness of the egg, by touching it with the tongue; for the shell, where it is not in contact with its contents, will soon feel warm, because it is quickly heated by the tongue; while the rest of the egg remains quite cold.

If a hole be made in the opposite end of the egg, and the egg be placed in a wine-glass with the hole downwards, and if it be thus set under the receiver of an air-pump, the expansion of the air in the cavity of the egg will force the contents through the hole till the shell is quite emptied. On re-admitting the air into the receiver, the air in the cavity of the egg is compressed into its original bulk; and the pressure of the air forces everything back again into the shell.

This experiment may also be varied by removing nearly one half of the egg-shell at the narrow end together with the white and yolk, and putting the remaining portion of the shell under the receiver. On removing the air, the air in the cavity will expand, and gradually detach the rest of the membrane from the shell, till it causes it to swell out and present the appearance of a whole egg. In like manner shrivelled apples, and other fruit, will swell out *in vacuo*, and appear like fresh fruit; in consequence of the expansion of the air confined in their cavities.

Upon the elasticity of the aëriform bodies depends also the action of portable gasometers, which at one time were very commonly used in London. The carburetted hydrogen is forced into these gasometers under a pressure of thirty atmospheres. These gasometers are made of iron; and before being admitted into use, they are tested by being filled with air under a pressure of sixty atmospheres. The gas is lighted at a jet fixed in the top of the gasometer; and the confined gas, constantly escaping by virtue of its elasticity supplies the flame, until the pressure of the gas and that of the external air coincide.

THE SNAP-DRAGON. (*Antirrhinum.*)

THIS singular flower is made the emblem of presumption, from its monopetalous corolla forming a mask, which resembles the face of an animal; and it has from hence received various names, as Dog's Mouth, Lion's Snap, Toad's Mouth, and Snap-Dragon. On pressing the sides of this flower it opens like a gaping mouth, the stigma appearing to represent the tongue; on removing the pressure, the lips of the corolla snap together and hence it has been named Snap-*Dragon.*

The Snap-Dragon belongs to the family of the Toad-Flax, and is a flower which we cannot examine without admiring how wonderfully it is adapted for the bleak situations in which it grows naturally, as on the highest rocks, or out of the crevices of the most exposed cliffs, or the chinks of the loftiest towers: in all of these situations its parts of fructification are guarded against the tempest by the singularly-shaped corolla, which defies either wind or rain to enter the flower until impregnation has taken place, when the mask falls off to allow a free access of air to the seed vessel. We have frequently remarked that the bees, and more particularly the humble-bees have entered this flower by pressing open the lips, as if they were conscious that such an opening existed, although it shuts so close as to deceive the nicest eye, and snaps to the moment the insect has gained admittance.

Linnæus placed this plant in the fourteenth class of his sexual system, which he named *Didynamia*, from two Greek words signifying *twice* and *power*, because the flower is furnished with four stamens, two of which are always considerably longer than the other two, and converging close to the upper lip of the corolla, each pair of anthers approaching, which renders the distinction of this class very striking.

This plant produces its flowers on a spike, but the whole of them fronting one way, which is generally to the sun; and as it gives out numerous branches from two to three feet in height, it becomes highly ornamental, particularly amongst dwarf shrubs. The colours of these flowers are numerous, consisting of all the shades of a rich orange and yellow down to white, with the same varieties in red and purple, and an endless change of party colours, the most esteemed of which is that with a gold-coloured throat, and a dark crimson mouth and lips.

The Snap-Dragon grows naturally in the south of Europe; and as it is frequently found on the cliffs of Dover, is now classed as one of the native plants of England, although it is generally supposed not to have been originally belonging to our soil.

These plants love a light soil and an open sunny situation, but when transplanted into a rich and moist earth, they produce larger flowers, though the plant generally dies in the winter, whilst those that grow on a dry or rocky soil continue for several years. They are easily raised from seed, which should be sown in April, and it may be increased also by cuttings, if planted during the summer months. When intended to ornament rock-work, the seeds should be scattered both in the autumn and in the spring, which will ensure a supply of plants without further trouble; and they endure the winter better in such situations than when growing in the borders of the garden.

The Antirrhinum may be considered rather a rustic than an elegant plant, and it should therefore not occupy a place in the parterre amongst choice flowers, but should be mixed with the shrubs in the background, or placed on banks, where, when in large clumps, it produces a showy effect from the end of spring to the autumn.

The use of eating oil in this country being so confined to the wealthy and higher orders of society, that the middle and lower classes have rather an antipathy than a desire for it in their food, this checks the cultivating of those plants that would afford us a substitute for olive-oil. Most of the continental countries consume a great deal of oil, which they consider indispensable in their diet, and hence they seek plants whose seeds yield the best oil. In Russia, the Antirrhinum is sown for the sake of the seed, which produces, by expression, an oil little inferior to that obtained from olives.—PHILLIPS' *Flora Historica.*

SCENES AND INCIDENTS IN THE WHALE-FISHERY.

Let the reader suppose himself on the deck of a South-Sea-man, cruising in the North Pacific Ocean, at its Japanese confines—he may be musing over some past event, the ship may be sailing gently along over the smooth ocean, everything around solemnly still, with the sun pouring its intense rays with dazzling brightness: suddenly the monotonous quietude is broken by an animated voice from the mast-head, exclaiming "There she spouts!" The captain starts on deck in an instant, and inquires "Where away?" But perhaps the next moment every one aloft and on deck can perceive an enormous whale lying about a quarter of a mile from the ship, on the surface of the sea, having just come up to breathe—his large "hump" projecting three feet out of the water—when at the end of every ten seconds the spout is seen rushing from the fore-part of his enormous head, followed by the cry of every one on board, who join heart and soul in the chorus of "There again!" keeping time with the duration of the spout. But while they have been looking, a few seconds have expired—they rush into the boats, which are directly lowered to receive them—and in two minutes from the time of first observing the whale, three or four boats are down, and are darting through the water with their utmost speed towards their intended victim, perhaps accompanied with a song from the headsman, who urges the quick and powerful plying of the oar with the common whaling chant of

Away, my boys, away my boys! 'tis time for us to go.

But while they are rushing along, the whale is breathing; they have yet perhaps some distance to pull before they can get a chance of striking him with the harpoon. His "spoutings are nearly out," he is about to descend, or he hears the boats approaching. The few people left on board, and who are anxiously watching the whale and the gradual approach of the boats, exclaim, "Ah, he is going down!" Yet he spouts again, but slowly; the water is again seen agitated around him; the spectators on board with breathless anxiety think they perceive his "small" rising in preparation for his descent. "He will be lost," they exclaim; for the boats are not yet near enough to strike him—and the men in each boat are still bending their oars with all their strength, to claim the honour of the first blow with the harpoon. The bow-boat has the advantage of being the nearest to the whale; the others, for fear of disturbing the unconscious monster, are now doomed to drop astern. One more spout is seen slowly curling forth—it is his last, this rising—his "small" is bent, his enormous tail is expected to appear every instant, but the boat shoots rapidly alongside of the gigantic creature. "Peak your oars," exclaims the mate, and directly they flourish in the air; the glistening harpoon is seen above the head of the harpooner; in an instant it is darted with unerring force and aim, and is buried deeply in the side of the huge animal. It is "socket up;" that is, it is buried in his flesh up to the socket which admits the handle or "pole" of the harpoon. A cheer from those in the boats, and from the seamen on board, reverberates along the still deep at the same moment. The sea, which, a moment before was unruffled, now becomes lashed into foam by the immense strength of the wounded whale, who with his vast tail strikes in all directions at his enemies. Now his enormous head rises high into the air, then his flukes are seen lashing everywhere; his huge body writhes in violent contortions from the agony the "iron" has inflicted. The water all around him is a mass of foam, some of it darts to a considerable height—the sounds of the blows from his tail on the surface of the sea can be heard for miles!

"Stern all," cries the headsman; but the whale suddenly disappears; he has "sounded;" the line is running through the groove at the head of the boat with lightning-like velocity; it smokes—it ignites, from the heat produced by the friction—the headsman, cool and collected, pours water upon it as it passes. But an oar is now held up in their boat; it signifies that their line is rapidly running out; 200 fathoms are nearly exhausted: up flies one of the other boats, and "bends on" another line, just in time to save that which was nearly lost. But still the monster descends; he is seeking to rid himself of his enemies by descending into the dark and unknown depths of the vast ocean. The next bend on the "drogues," to retard his career, but he does not turn; another and another have but slight influence in checking the force of his descent; two more lines are exhausted—he is 600 fathoms deep! "Stand ready to bend on!" cries the mate of the fourth boat, (for sometimes though not often, they take the whole four lines away with them—800 fathoms); but it is not required, he is rising. "Haul in the slack," observes the headsman, while the boat-steerer coils it again carefully into the tubs as it is drawn up. The whale is now seen approaching the surface; the gurgling, and bubbling water, which rises before, also proclaims, that he is near; his nose starts from the sea; the rushing spout is projected high and suddenly, from his agitation. The "slack" of the line is now coiled in the tubs, and those in the "fast" boat haul themselves gently towards the whale; the boat-steerer places the headsman close to the fin of the trembling animal, who immediately buries his long lance in the vitals of the leviathan, while, at the same moment, those in one of the other boats dart another harpoon into his opposite side: when "Stern all!" is again vociferated, and the boats shoot rapidly away from the danger.

Mad with the agony which he endures from these fresh attacks, the infuriated "sea beast" rolls over and over, and coils an amazing length of line around him; he rears his enormous head, and, with wide-expanded jaws, snaps at everything around; he rushes at the boats with his head; they are propelled before him with vast swiftness, and sometimes utterly destroyed.

He is lanced again, when his pain appears more than he can bear; he throws himself, in his agony, completely out of his element; the boats are violently jerked, by which one of the lines is snapped asunder; at the same time the other boat is upset, and the crew are swimming for their lives. The whale is now free! He passes along the surface with remarkable swiftness, "going head out;" but the two boats that have not yet "fastened," and are fresh and free, now give chase; the whale becomes exhausted, from the blood which flows from his deep and dangerous wounds; and the two hundred fathoms of line belonging to the overturned boat, which he is dragging after him through the water, checks him in his course: his pursuers again overtake him, and another harpoon is darted and buried deeply in his flesh.

The men who were upset now right their own boat, without assistance from the others, by merely clinging on one side of her, by which she is turned over; while one of them gets inside, and bales out the water rapidly with his hat, by which their boat is freed, and she is soon again seen in the chase.

The fatal lance is at length given—the blood gushes from the nostril of the unfortunate animal in a thick black stream, which stains the clear blue water of the ocean to a considerable distance around the scene of the affray. In its struggles the blood from the nostril is frequently thrown upon the men in the boats, who glory in its show.

The immense creature may now again endeavour to "sound," to escape from his unrelenting pursuers; but it is powerless—it soon rises to the surface, and passes slowly along, until the death-pang seizes it, when its appearance is awful in the extreme.

Suffering from suffocation, or some other stoppage of some important organ, the whole strength of its enormous frame is set in motion for a few seconds, when his convulsions throw him into a hundred different contortions of the most violent description, by which the sea is beaten into foam, and the boats are sometimes crushed to atoms, with their crews.

But this violent action being soon over, the now unconscious animal passes rapidly along, describing in his rapid course a segment of a circle. This is his "flurry," which ends in his sudden dissolution. And the mighty rencontre is finished by the gigantic animal rolling over on its side, and floating an inanimate mass on the surface of the crystal deep, a victim to the tyranny and selfishness, as well as a wonderful proof of the great power of the *mind* of man.

This soul-stirring pursuit, in comparison to which all other sport seems child's play (says a writer in the *Quarterly Review*), has its melancholy as well as its exhilarating hours. The horrors of the night here described, deepened by the death of the "man overboard," and by the belief that the captain and two boats' crew had shared the same fate, must have been fearful indeed. But the whale, it seems, was the salvation of those who had been given up for lost, and it is no longer a poetical fiction that—

> The pilot of some small night-foundered skiff;
> Moors by his side under his lee, while night
> Invests the sea, and wished morn delays.

In the afternoon of a day which had been rather stormy, while we were fishing in the North Pacific, a "school" of

young bull-whales made their appearance close to the ship, and as the weather had cleared up a little, the captain immediately ordered the mate to lower his boat, while he did the same with his own, in order to go in pursuit of them.

The two boats were instantly lowered, for we were unable to send more, having had two others "stove" the day before; they soon got near the whales, but were unfortunately seen by them, before they could dart the harpoon with any chance of success: and the consequence was that the "pod" of whales separated, and went off with great swiftness in different directions. One however, after making several turns, came at length right towards the captain's boat, which he observing, waited in silence for his approach, without moving an oar, so that the "young bull" came close by his boat, and received the blow of the harpoon some distance behind his "hump," which I saw enter the flesh myself, as it occurred close to the ship. The whale appeared terror-struck for a few seconds, and then suddenly recovering itself, darted off like the wind, and spun the boat so quickly round when the tug came upon the line, that she was within a miracle of being upset. But away they went, "dead to windward," at the rate of fifteen miles an hour, right against a "head sea," which flew against and over the bows of the boat with uncommon force, so that she at times appeared ploughing through it, making a high bank of surf on each side.

The second mate, having observed the course of the whale and boat, managed to waylay them, and when they came near to him, which they speedily did, a "short warp" was thrown, and both boats were soon towed at nearly the same rate as the captain's boat had been before.

I now saw the captain darting the lance at the whale, as it almost flew along, but he did not seem to do so with any kind of effect, as the speed of the whale did not appear in the least diminished, and in a very short time they all disappeared together, being at too great a distance to be seen with the naked eye from the deck. I now ran aloft, and, with the aid of a telescope, could just discern from the mast-head the three objects, like specks upon the surface of the ocean, at an alarming distance. I could just observe the two boats, with the whale's head occasionally darting out before them, with a good deal of "white water" or foam about them, which convinced me that the whale was still running. I watched them with the glass until I could no longer trace them, even in the most indistinct manner, and I then called to those on deck, that they might take the bearing by compass of the direction in which I had lost sight of them, that we might continue to "beat" the ship up to that quarter.

It was now within half an hour of sunset, and there was every appearance of the coming on of an "ugly night," as a seaman would say: indeed the wind began to freshen every moment, and an "awkward bubble" of a sea soon began to make. I remained aloft until I saw the sun dip, angry and red, below the troubled horizon, and was just about to descend when I was dreadfully shocked at hearing the loud cry of "A man overboard!" from all upon deck. I looked astern, and saw one of our men, of the name of Berry, grappling with the waves, and calling loudly for help. The ship was soon brought round, but in doing so she unavoidably passed a long way from the poor fellow, who still supported himself by beating the water with his hands, although he was quite unacquainted with the proper art of swimming. Several oars were thrown overboard the moment after he fell, but he could not reach them, though they were near to him; and directly the ship was brought up, a Sandwich islander, who formed one of the crew, leaped overboard, and swam towards him, while at the same time the people on the deck were lowering a spare boat, which is always kept for such emergencies. I could be of no service except to urge their expedition by my calls, for it was only the work of a few minutes. The good Sandwich islander struck out most bravely at first, but in a short time, finding that he was some distance from the ship, and being unable to see Berry, on account of the agitated surface of the sea, actually turned back through fear—finding, as he said, that the "sea caps" went over his head. The men in the boat now plied their oars with all their strength, and were making rapidly towards the drowning young man, who now and then disappeared entirely from view, under the heavy seas which were beginning to roll: a sickening anxiety pervaded me, as my thoughts appeared to press the boat onwards to the spot where the poor fellow still grappled, *but convulsively*, with the yielding waters. The boat, *urged by man's utmost strength*, sprang over the boisterous waves with considerable speed; but they arrived half a minute too late to save our poor shipmate from his watery grave. I saw him struggle with the waves until the last, when the foam of a broken sea roared over him, and caused him to disappear for ever! The boat was rowed round and round the fatal spot, again and again until night fell, and then she was slowly and reluctantly pulled to the ship by her melancholy crew. As they returned, the turbulent waves tossed them about, as if in sport, making the boat resound from the beating of the dashing waters which flew against her bow.

The moment the unfortunate seaman disappeared, a large bird of the albatross kind came careering along, and alighted on the water at the very spot in which the poor fellow was last seen. It was a curious circumstance, and only served to heighten our horror, when we saw this carnivorous bird seat itself proudly over the head of our companion; and which also served to remind us of the number of sharks that we had so frequently seen of late, of the horrible propensities of which we could not dare to think.

By the time we had hoisted in the boat it was quite dark; the winds too had increased to half a gale, with heavy squalls at times, so that we were obliged to double-reef our topsails. Our painful situation now bore most heavily upon us. We had lost one of our men, who had sailed with us from England—the bare thought of which in our circumstances aroused a crowd of heart-rending ideas. Our captain and second mate, with ten of the crew, had also disappeared, and were by this time all lost, or were likely to be so in the stormy night which had now set in; being, too, several hundred miles away from any land. We, however, kept beating the ship to windward constantly, carrying all the sail that she could bear, making "short boards," or putting about every twenty minutes. We had also, since nightfall, continued to burn blue lights, and we had likewise a large vessel containing oil and unravelled rope, burning over the sternrail of the ship, as a beacon for them, which threw out a great light. But although all eyes were employed in every direction searching for the boats, no vestige of them could be seen; and therefore, when half-past nine P. M. came, we made up our minds that they were all lost; and as the wind howled hoarsely through the rigging, and the waves beat savagely against our ship, some of us thought we could hear the shrieks of poor Berry above the roaring of the storm: others imagined, in their melancholy, that they could occasionally hear the captain's voice, ordering the ship to "bear up," while the boats had been seen more than fifty times by anxious spirits, who had strained their eyes through the gloom, until fancy robbed them of their true speculation, and left her phantasmagoria in exchange.

There were not many on board who did not think of home on that dreadful night—there were not many among us who did not curse the sea, and all sea-going avocations; while, with the same breath, they blessed the safe and cheerful fire-side of their parents, which at that moment they would have given all they possessed but to see. But at the moment despair was firmly settling upon us, a man from aloft called out that he could see a light right a-head of the ship, just as we were "going about," by which we should have gone from it. We all looked in that direction, and in a few minutes we could plainly perceive it: in a short time we were close up with it, when, to our great joy, we found the captain and all the men in the boats, lying to leeward of the dead whale, which had in some measure saved them from the violence of the sea. They had only just been able to procure a light, having unfortunately upset all their tinder, through the violent motion of the boats, by which it became wet—but which they succeeded in igniting after immense application of the flint and steel—or their lantern would have been suspended from an oar directly after sunset, which is the usual practice when boats are placed under such circumstances.

After having secured the whale along-side, (which we expected to lose during the night from the roughness of the weather,) they all came on board, when the misfortune of poor Berry was spoken of with sorrow from all hands, while their own deliverance served to throw a ray of light amidst the gloom.—BEALE'S *Natural History of the Sperm Whale.*

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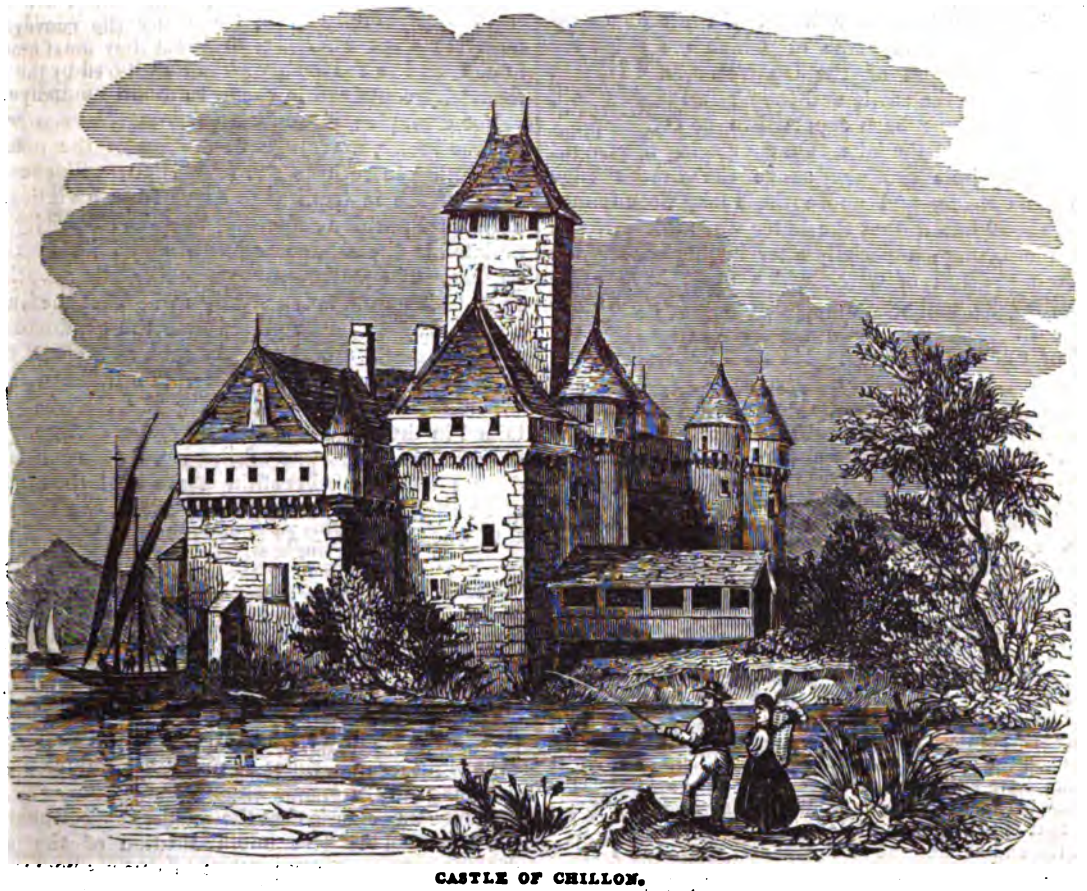
THE CASTLE OF CHILLON.



CASTLE OF CHILLON.

There are seven pillars of Gothic mould
In Chillon's dungeons deep and old,
There are seven columns, massy and gray,
Dim with a dull imprisoned ray,—
A sunbeam which hath lost its way,
And through the crevice and the cleft
Of the thick wall is fallen and left;
Creeping o'er the floor so damp,
Like a marsh's meteor-lamp.

The associations connected with Switzerland are calculated to excite considerable emotion. Its enchanting scenery, picturesque valleys, and lofty mountains, forming, perhaps, the only country in Europe whose inhabitants have preserved the simplicity of patriarchal manners,—the historical dramas which have been acted on this wild and beautiful scene, which has also supplied the poet and the artist with the subjects of their choicest productions,—all this has contributed to render Switzerland the most remarkable country in Europe.

But no part of this romantic land is richer in natural and mental associations than the Lake of Geneva, whether considered with reference to the picturesque, or the historical, or the number of distinguished individuals, who have dwelt upon its banks, and have celebrated almost every tree, every rock, and every little isle. Would that we could add that most of these writers, attracted, as they were, to this spot by the beauties of nature, had devoted their high powers for their Creator's glory and for the benefit of mankind at large; instead of profaning nature's sanctuary by mistaking nature for nature's God.

On the north-eastern bank of the Lake of Geneva, near the mouths of the rapid Rhone, is situate the castle of Chillon, between Clarens and Villeneuve: and about a mile and a half from the former, opposite the castle on the south, are the beautiful heights of Meillerie, which shut out the view of the Savoy Alps.

At this spot the lake is seven miles wide, and very deep. The castle is built on a flat rock near the shore, and connected therewith by a wooden bridge. "Chillon," says a recent tourist, "which is long, white, and, till closely approached, more like a modern than an ancient building, is backed by mountains covered with verdure."

The castle of Chillon, or rather the castellated house, (says Coxe,) is a large pile with round and square towers, standing on a rock in the lake, and connected with the land by a draw-bridge. The vaults are very fine; the arched roof, and the pillars which support it, are in a neat Gothic style. This castle, in 1536*, was wrested from Charles the

* The castle of Chillon was seized by the insurgents in January, 1798, and this act of rebellion not being punished, was followed by the separation of the Pays de Vaud from the Canton of Bern.

Third of Savoy by the Canton of Bern, assisted by the Genevans, who furnished a frigate (their naval force) to besiege it by water. In a deep dungeon below the level of the lake, the conquerors found Bonivard, prior of St. Victor, the intrepid antagonist of the dukes of Savoy, and the great assertor of Genevan independence. He had been imprisoned by the Savoyards during six years, and by constant walking in his short limits, had worn a hollow in the rock. This castle was for a short time the residence of a bailiff from Bern, until a more convenient house was purchased in Vevay.

Across one of the vaults of the castle is a beam, black with age, on which condemned prisoners are said formerly to have been hung. In the dungeons are seven pillars, in some of which are rings for securing the fetters of the captives. In 1817 M. Simond visited the castle and the far-famed dungeon, which had so long been reported to be considerably below the level of the lake. On comparing the height of the loop-hole gratings above the water's edge from the outside, and above the rocky floor inside, he satisfied himself that the latter was more elevated than the former; especially after having observed a hollow place full of water, which must have come from the lake, and would have risen above the floor of the dungeon, if it had really been lower than the level of the water outside. He adds ironically,—

It grieves me to contradict poets, or picturesque and sentimental tourists, but really the dungeon of Chillon is not under water; and, moreover, it is positively a comfortable enough sort of dungeon, full forty feet long, fifteen or twenty feet wide, and fifteen feet high, with several narrow openings in the thick wall, above reach it is true, but admitting air and light, and even some rays of sunshine.

Mr. John Scott visited Chillon in 1819. It was on a Sunday, and he prettily remarks,—

While I was regarding a beautiful cottage below the church, and a small terrace garden,—small enough to be happy,—a spot hid from the storms of life,—the sound of psalm-singing broke out from the church. I afterwards heard bells, coming down the Alpine glens.

The arms of the Pays de Vaud are painted like a playing card upon the walls of the Château of Chillon. The Swiss soldiers have a flat and bourgeois air; they are somewhat midway between feudals and train-bands; their costume is like that of the knave of clubs. The view, looking back from the end of the lake at Villeneuve, is fine; the castle is interesting from its idle uselessness; the times are gone when it was of service.

In order to understand the last allusion, it must be stated that the castle was a state prison at the time of the Reformation, and a sort of bastile during the French Revolution.

THE manufacturers of the nests, so greatly in esteem in China, are small swallows, which are supposed to collect the glutinous substance of which they are composed from the sea. The nests resemble small tea-saucers in form, the rim being about the size of that of a tumbler. The best, that is, those collected before the eggs of the bird have been laid, are of a light red colour, and nearly transparent, bearing almost a perfect resemblance to isinglass, except that they are rather more brittle. China is almost the only market for this delicacy, the nests being greatly in demand throughout the Celestial Empire, in consequence of their supposed nutritious qualities. They are of three different degrees of excellence, and the best kind is sold in China at the rate of nine shillings an ounce. When used for culinary purposes, they are dissolved in water, and made into a tasteless soup. I have eaten them several times, at the tables of rich Chinese, but must confess that they did not strike me as being at all agreeable to the palate: in fact, it is difficult to distinguish the slightest flavour. The collection of these nests is a work of danger and difficulty; they are taken periodically, and it is necessary to station proper persons at the mouths of the caverns, to prevent the birds from being disturbed by intruders.—EARL's *Voyages*.

ELECTRICITY.

No. X.

EFFECTS OF ACCUMULATED ELECTRICITY.

IN all cases of electrical excitation, there is a tendency in the disturbed elements to return to their former state of repose. This struggle, for such it may not improperly be termed, to recover its equilibrium, being greater in proportion as the intensity of the accumulated charge is increased.

Let it be remembered that the *tension*, or *intensity*, of electricity, affords only a relative and very imperfect indication of *quantity*; the former terms being understood as referring to the electrical states of bodies, and to the energy exhibited by the redundant electricity contained in them, to make its escape.

For example: if we fix a *quadrant electrometer** on the conductor, a very gentle motion of the machine, amounting scarcely to one revolution, will cause the index of the instrument to move from a vertical to a horizontal position; showing that the electricity accumulated in the conductor has attained its maximum tension. The motion of the machine being continued, so as to keep the index steady at 90°, let the knob of a small Leyden jar be placed near the conductor, say within about half an inch. As soon as a spark passes from the latter to the former, the index will fall; which denotes that by diffusing the electricity contained in the conductor over a greater surface, that is over the coated portion of the jar, its tension is suddenly reduced. Still continuing to work the machine, and noting the number of revolutions, we shall find that when a few sparks have entered the jar, the electrometer will be again affected; as the charge accumulates, the index gradually rising, until it points, as in the former instance, at 90°. Removing the small jar, suppose we substitute for it one considerably larger, and proceeding, as already described, we shall find, that instead of three or four revolutions of the machine, which suffice to produce the maximum tension in the small jar, the larger one will require perhaps eight or ten times as many to produce a corresponding result.

Hence we remark that the quadrant electrometer is not intended to give any indication of the actual quantity of electricity present in various bodies; but its chief utility consists in its enabling the operator to detect any error in his arrangements, or defect in the apparatus; whilst in connexion with Leyden jars, whose capacities for retaining a charge are previously ascertained, this instrument can be made to supply the place of those of a more expensive character.

Nor must we fail to mention, that although it may be sometimes necessary to note the number of revolutions made by the machine, yet they afford only a vague means of estimating the quantity of electricity produced by its agency. From various causes a machine will be more active at one time than another; and even when all other circumstances are equal, a skilful manipulist will in ten minutes bring into action a greater quantity of electricity than can be produced from the same machine by an inexperienced operator in an hour.

The electricity accumulated in a Leyden jar, or other non-conducting, or insulated body, having reached its maximum tension, whatever may be afterwards communicated to it is instantly dissipated, entering into such bodies as may be near, or if there be none within striking distance, then, as most commonly happens, the redundant electricity diffuses itself into the surrounding air. This will be better understood by charging a jar in the dark; for, as soon

* See *Saturday Magazine*, Vol. XIII., p. 229.

as a certain quantity of electricity has entered it, there will be seen issuing from the edges of the jar, and those of the tin-foil coating, streams of pale blue light, accompanied by a hissing sound.

The state of the atmosphere, as affecting electrical experiments, has already been mentioned. We may here further remark that it is impossible to operate with any certainty of success, with accumulated electricity, unless the jars containing it are quite clean, and free from moisture; and, as one means of ensuring the latter condition, we must take care that the temperature of the jars is not lower than that of the air in the room. It rarely happens that very accurate electrical investigations can be conducted in a room where a great number of persons is assembled. The temperature may be sufficiently high; but the successful illustration of electrical phenomena depends less upon temperature than upon the quantity of vapour present. The higher the temperature of the air, the greater the quantity of vapour it is capable of containing; and as the sources of vapour, under the circumstances just mentioned, are abundant, we may perceive why a crowded room is unfavourable to the objects of which we are treating.

There is a limit to the quantity of electricity which a Leyden jar can be made to contain; depending partly on the form, structure, and arrangement of the several parts of the jar itself, and partly on external circumstances, as for instance the state of the surrounding air, and the situation of the jar, with respect to other bodies.

Let a jar, with a quadrant electrometer attached to it, be connected with the conductor, and charged in the usual way, until the index rises to 60°. If it be then detached from the machine, the jar, supposing it to be well arranged, quite clean and dry, and the surrounding air in a favourable state, will retain the greater part of the electricity accumulated in it for several minutes, and perhaps hours; but the action of the electrometer will show that some part is escaping. Let the same jar be now wiped just above the coating with a damp cloth, or it may be placed near an open window or door: then if we attempt to charge it, we shall find it a difficult matter to raise the index of the electrometer to the same point as before; and if we do, it will continue there only so long as we maintain the action of the machine.

But when everything is favourable, and the arrangements as perfect as they can be made, a jar will contain only a certain quantity of electricity; and, if we attempt to force more into it, we occasion what is termed a *spontaneous discharge*; which means that the electricity has forced for itself a passage over the uncoated parts, and around the edges of the jar; or, as sometimes happens, that it has passed through the substance of the glass. In the latter case, the glass being perforated, although the fracture may be so small as only with difficulty to be detected, the jar is thereby rendered useless. Hence it is important to guard against these spontaneous discharges; for if the jar be not broken by the concussion, we have noticed that when thus acted upon many times, its power of retaining a charge is very much lessened. The tendency to discharge spontaneously is greater in jars fitted up with covers, and especially when the covers are fixed, than when the mouth of the jar is left open. This is one reason why we prefer to any other the arrangement described in our last paper.

It was shown, when speaking of induced electricity, that the effect of electrical excitation, produced on one side of a plate of glass, was instantly apparent on the opposite side; induction taking place through the substance of the glass itself. It may hence be reasonably inferred that the thinner the glass of which a Leyden jar is made, the more promptly will it receive a charge. The fact is so; but still it is not advisable that the glass should be very thin; for in proportion that its readiness in receiving a charge is thereby increased, so is its power of retaining it diminished. For all practical purposes the jars commonly used by druggists and confectioners are found the most useful; those of a moderate and uniform thickness, and without irregularities of surface, being always selected.

A Leyden jar which has just been discharged will be found a few minutes afterwards still to contain a small quantity of electricity, as will be indicated by its yielding a faint spark. This is called the *residual* charge; and consists of that portion of electricity which penetrates beneath the surface of the glass, and of that, which in its endeavour to escape, spreads itself around and beyond the edges of the coating. When the first discharge takes place, the electricity occupying the situations just named, is too distant from the coating to make its escape suddenly; but the pressure from behind it being removed, it slowly returns from its state of isolation and entanglement, and diffusing itself over the coated surface of the jar, may be dislodged by a second discharge, as already mentioned.

This residual charge is greater in proportion to the tension of the accumulated electricity. It is greater from some jars than others; and when a jar spontaneously discharges itself, than when discharged in the ordinary way. As it is in most cases sufficiently powerful to occasion a very disagreeable shock, the careful experimentalist will test every recently discharged jar before he again uses it.

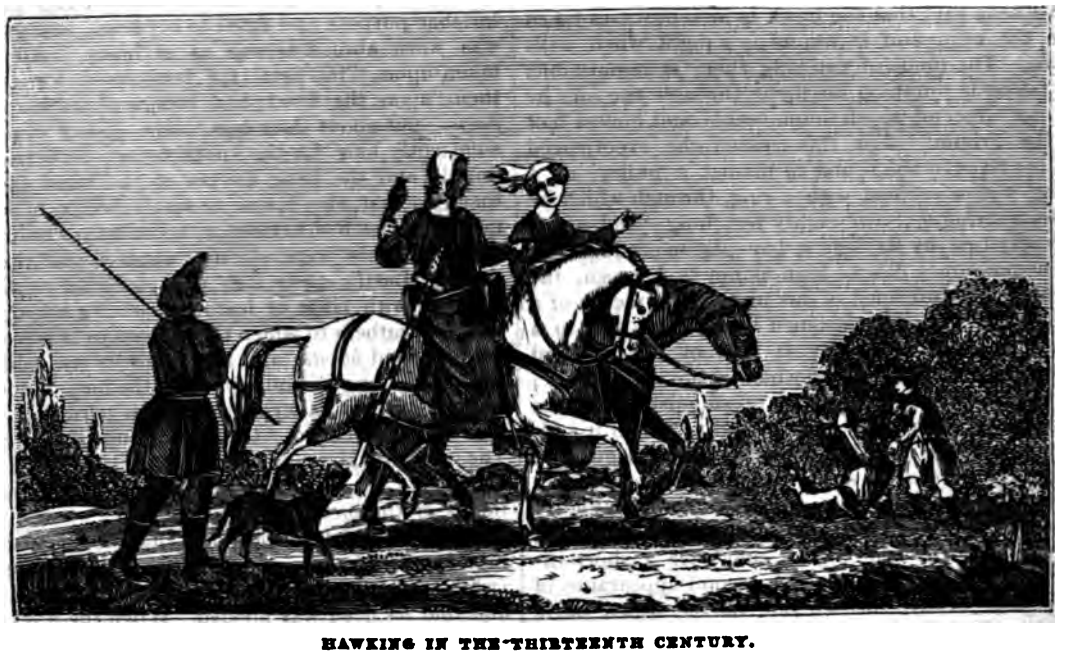
When large quantities of electricity are required, any number of jars may be combined in such a way that they can all be charged and discharged in the same manner as a single jar. This arrangement is termed an *electrical battery*. The interior coatings of all the jars in the series, must be in metallic communication with each other; the most convenient method of accomplishing which is by a frame-work of brass rods, the angular portions terminating in balls. To facilitate the removal of the jars from place to place, they may be fitted into a box having separate compartments for the reception of each jar. It is also desirable that provision be made for removing and replacing any of the jars without deranging those that remain. The exterior coatings of the whole series must also communicate. This can be effected by covering the bottom of the box with tin-foil; and then the battery may be discharged, by means of some fixed object in contact with the foil, as a hook or ball for instance, which thus becomes common to each jar.

The caution already given to prevent if possible the spontaneous discharge of a single jar is still more necessary in the management of a combined series; the most trifling defect in any one jar rendering useless the whole battery, until the fractured jar has been removed.

THE respect for, and the study of, the works of creation, tend to make us wiser and happier, and lead us to the contemplation of the omniscient Dispenser of the objects we admire.—MAUND.

THE region of passion is a land of despotism, where reason exercises but a mock jurisdiction, and is continually forced to submit to an arbitrary tyrant, who, rejecting her fixed and temperate laws, is guided only by the dangerous impulse of his own violent and uncontrollable wishes.—?

ENGLAND IN THE OLDEN TIME. No. VI.



HAWKING IN THE THIRTEENTH CENTURY.

Hawking, or Falconry.

One of the most esteemed pastimes of the English gentry in bygone times, was *Hawking*, or *Falconry*, which are synonymous terms. Persons of high rank rarely appeared without their dogs and their hawks when abroad: they even took their hawks with them when they went to battle. A writer of the fifteenth century complains in rhyme of the custom of bringing hawks and other sporting animals into churches:—

Into the church then comes another sotte,
Withouten devotion, jetting up and down,
Or to be seene, and showe his garded cote.
Another on his fiste a sparhawke or fawcone,
Or else a cokow; wasting so his shone;
Before the aulter he to and fro doth wander,
With even as great devotion as doth a gander.
In comes another, his houndes at his tayle,
With lines and leashes, and other like baggage;
His dogges barke, so that withouten fayle,
The whole church is troubled by their outrage.

As to the question when hawking had its origin, no certainty exists, for there are many passages in early writers which seems to indicate the prevalence of a custom something like this. The principle which distinguishes it is this; to hunt down and capture some species of birds by means of trained birds of another species. In India, in former times, kites were trained to catch animals of various kinds. To train these kites, the Indians let loose a tame hare or fox, with a piece of flesh fastened to it, and suffered the birds to fly after it, in order to seize the flesh, of which they are fond, and which, on their return, they received as the reward of their labour. When thus instructed to pursue their prey, they were sent after wild foxes and hares in the mountains; these they followed in hopes of obtaining their usual food, and soon catch them and bring them back to their masters.

The training of a hawk is a remarkable exercise of perseverance, in overcoming the natural habits of the bird. They are sometimes taken from the nest, and at other times are captured in a grown-up state, and then disciplined. The objects which the falconer has in view are,—to accustom the bird to settle on his fist, to spring when he throws him off, to know the voice, the singing, the whistling, or any other signal from the falconer, and to return when called. first they are tied with a string about thirty fatho in length, to prevent them from flying away; fr which they are not released till they are complet disciplined, and return at the proper call or sig For this purpose they must be *lured*. The lure i piece of red stuff or wool, on which are fixed a h talons, and wings. To this is likewise fastene piece of that flesh on which the bird feeds, and lure is thrown out to him. When they intend reclaim or recall him, the sight of food brings h back; and in time the voice will be sufficient. T various plumage with which the lure is decked called a "Drawer." When they accustom the ha to fly at a kite, a heron, or a partridge, they cha the "drawer" according to the kind of game to wh he is to be devoted. When this is a kite, they fix bill and feathers of that bird to the lure; and so the rest: and in order to entice the bird to his obje they fasten beneath the drawer or plumage the fl of a chicken or other fowl, occasionally seasoned w sugar and spices, together with marrow and otl delicacies. Thus he is prepared for springing at n game. Having been accustomed to a month's ex cise in a room or garden, the bird is then tried in t open field, with little bells fastened to his feet, order to give information of his motions. He always capped or hooded, that he may see no obj but his game; and as soon as the dogs either stop spring the game, the falconer unhoods the bird, a tosses him into the air after his prey. His vari motions in the air furnish much diversion. At len he descends, and launches upon his prey with rapidity of an arrow; and bears it to his mast who recalls him. On these first essays he is presen with the neck and other parts of the bird, as a rew These gratuities, and the caresses of the falco animate the bird to the performance of his duty, prevent him from "bearing away his bells," that from flying off and not returning.

The principal means by which the falconer g the ascendency over the hawk, is by appealing to appetite. This is managed in a hundred ways lead the bird by indirect means to obey the falco Sometimes the bird is kept almost without food

several days, in order to break his spirit and reduce him to obedience.

We have said that the hawk is in some cases taken from the nest, and at others is caught when well-grown. The mode of catching them is remarkable. If a falcon is pursuing his flight through the air, he will not descend to an immoveable and lifeless bait on the ground. For this reason the experienced falconer fixes in the centre of his net a pulley, or a strong iron wire bent with a ring, through which he passes a string sixty or eighty feet long; and at its extremity ties by its legs a live pigeon; and as the falcon sometimes flies so high as not to be seen, the sportsman is informed of his motions by means of a butcher-bird, which is fastened by a string, tied to a stick, near the neck. By its movements this bird indicates the kind of hawk which is hovering above; if it be a buzzard, or any kind of sluggish hawk, the butcher-bird's motions are but slight; but if it suddenly flies down and hides itself, it is a sign that some large falcon is above; and the falconer then lets out the pigeon, whose apparent state of liberty attracts the sight of the falcon. If approached readily, the man withdraws the pigeon, and after a short interval, lets it out again: the second appearance of the pigeon always invites the falcon, which darts upon it as its prey, and is consequently caught in the net, which the man instantly draws over it.

Kings, knights, ladies, and all the most important personages in the land, were fond of the pastime of hawking: indeed, there is no out-door amusement in which ladies joined to so great an extent as hawking. They not only accompanied gentlemen in the sport, but often practised it by themselves. Hawking was forbidden to the clergy by the canons of the church; but the prohibition was by no means sufficient to restrain them from the pursuit of this favourite and fashionable amusement. Edward the Third, according to Froissart, had with him in his army when he invaded France, thirty falconers on horseback, who had charge of his hawks, and every day he either hunted or hawked, as his fancy led him. An anonymous writer, of the seventeenth century, states the following anecdote:

Sir Thomas Jermin, going out with his servants and brooke hawks one evening at Bury, they were no sooner abroad, but fowle were found, and he called out to one of his falconers, "Off with your jerkin." The fellow being into the wind (to the windward) did not heare him; at which he stormed, and still cried out "Off with your jerkin, ye knave, off with your jerkin:" now it fell out that there was at that instant a plaine townsman of Bury, in a freeze jerkin, stood betwixt him and his falconer, and who seeing Sir Thomas in such a rage, and thinking that he had spoken to him, unbuttoned himself amaine, threw off his jerkin, and besought his worshippe not to be offended, for he would off with his doublet too, to give him content.

The manner in which hawking was indulged in was either on horseback or on foot, as occasion required. On horseback, when in the open fields or open country, as represented in our cut, and on foot when in woods and coverts. In following the hawk on foot, it was usual for the sportsman to have a stout pole with him, to assist him in leaping over little rivulets and ditches, which might otherwise retard his progress; and this we learn from an historical fact related by Hall. Henry the Eighth, pursuing his hawk on foot, at Hitchin, in Hertfordshire, attempted, with the assistance of his pole, to jump over a ditch that was half full of muddy water. The pole broke, and the king fell with his head into the mud, where he would have been stifled, had not a footman, who was near at hand, leaped into the ditch, and released his majesty from his perilous situation.

When the hawk was not flying at her game, she was usually covered with the hood or cap provided for that purpose and fitted to her head; and this hood was worn abroad as well as at home. All hawks taken upon "the fist," the term used for carrying them upon the hand, had straps of leather, called *jessies*, put about their legs. The jessies were made sufficiently long for the knots to appear between the middle and the little fingers of the hand that held them, so that the lunes, or small thongs of leather, might be fastened to them with small tyrrets or rings, and the lunes were closely wound round the little finger. Lastly, their legs were adorned with bells, fastened with rings of leather, each leg having one; and the leathers to which the bells were attached were denominated *bewits;* and to the bewits was added the *creance,* or long thread, by which the bird, in tutoring, was drawn back, after she had been permitted to fly, and this was called "the reclaiming of the hawk." The person who was exercising the diversion of hawking, had a glove on the hand, to protect it from the talons of the bird.

It will be understood then that in the pastime of hawking or falconry, a hawk was held on the hand (whether the sportsman was on horse or on foot), and that its head was hooded. When the dogs which accompanied them gave notice of the proximity of partridges, pheasants, or some similar bird, the hood was instantly taken off the hawk, he was made to see his prey, and then set loose. He immediately started in pursuit, killed his victim, and returned to the hand of his master or mistress. This was the task allotted to the hawk; and it may well be supposed that constant and severe training was necessary, to bring it to that degree of obedience.

In France there was an officer called the "Grand Falconer," who was a person of much importance: his annual salary was four thousand florins: he was attended by fifty gentlemen, and fifty assistant falconers. He was allowed to keep three hundred hawks: he licenced every vender of hawks in the kingdom, and received a tax upon every bird sold in the kingdom, even within the verge of the court itself, and the king never rode out upon any occasion of consequence, without this officer attending upon him.

Birds, which ministered so much to the amusement of the titled and wealthy, were naturally valued at a high price, and particular laws enacted for their preservation. In Henry the Seventh's reign it was enacted that if any one should take the eggs out of a hawk or falcon's nest, he should suffer imprisonment for one year and a day, and be liable to a fine at the king's pleasure; one half of which belonged to the crown, and the other half to the owner of the ground whereon the eggs were found; and if a man destroyed the eggs upon his own ground, he was equally subject to the penalty. At the commencement of the seventeenth century, a gos-hawk and a tassel-hawk were sold for one hundred marks, a large sum in those days, but which was not considered too large for a bird whose rearing required such extraordinary care, time, and trouble, as that of the hawk. It was considered by no means a mean present from one sovereign to another. In the eighth year of the reign of Edward the Third, the king of Scotland sent him a falcon as a present, which he not only most graciously received, but rewarded the falconer who brought it with a donation of forty shillings—a proof how highly the bird was valued.

Hawking is altogether a relic of times long gone by. Nothing of the kind is now known in England. It flourished for many centuries, and was perhaps never

in greater favour than in the beginning of the seventeenth century; but by the end of the same century it was rarely practised. It was regarded quite in the light of a science. Treatises were written in English, Latin, French, Italian, and other languages, descanting fully on the whole art and mystery of training and using hawks. There is one called "The Booke of Falconrie or Hawking; for the onely delight and pleasure of all Noblemen and Gentlemen," written by George Tuberville, about 250 years ago. He gives a quaint "copy of verses," in favour of hawking, from which a short extract must close our paper.

I deeme that no Man doubts but games and all our chiefe delightes,
Were first deuised to daunt the dumps of pensive pained sprites,
To clear the clowds of drowping cares and mists of mournfull mind,
And banish all that heauie harts in cheereleese chaines did bind.
If games were thus found out at first, for mind and bodies ease,
As well to quit that one of griefes as th' other of disease;
Why then? of force it follow must, that those delightes are chiefe,
And most to be imbrast, that lend to either parte reliefe.
Which if be so I need not blush, or deeme it my disgrace,
If Hawks and Spanels I preferre, and set in highest place.
For truely no deuise delights, the mind of man so much,
No game so gladsome to the limmes, there is no pleasure such!
No Phisicke fitter to remoeue the dregs of direfull paine,
And to restore to former life, the feeble force againe!

DEATH OF COWPER.—The poet's death had been so placid and tranquil, that not one of the five persons who surrounded his bed was conscious of the termination of his mortal existence; and the expression of calmness and composure, mingled, as it were, with the "holy surprise," which settled on his countenance, might have delighted his friends with the assurance that the shadow had been swept from his closing eyes: and that One had shone over his pillow, whose salutation was PEACE! His epitaph may be found in the beautiful verse of a spirit related to his own in gentleness and truth, upon whom the "mild rays of Paradise" have also broken.

Thou art gone to the grave; and earth's mansions forsaking,
Perchance thy weak spirit in fear lingered long;
But the mild rays of Paradise beamed on thy waking,
And the sound which thou heard'st was the seraphim's song.
HEBER.

WILLMOTT'S *Lives of Sacred Poets.*

IN the parish of St. Olave, Tooley Street, Borough, the church-yard is detached from the church, and surrounded with high buildings, so as to be wholly inaccessible but by one large close gate. "A poor tailor of this parish dying," (says Mr. BLAINE, in his *Canine Pathology*,) "left a small cur dog inconsolable for his loss. The little animal would not leave his dead master even for food: and whatever he ate, was obliged to be placed in the same room with the corpse. When the body was removed for burial, this faithful attendant followed the coffin. After the funeral, he was hunted out of the church-yard by the sexton. The next day he again found the animal, who had made his way, by some unaccountable means, into the enclosure, and had dug himself a bed on the grave of his master. Once more he was hunted out: and again he was found in the same situation the following day. The minister of the parish, hearing of the circumstance, had him caught, taken home and fed, and endeavoured by every means to win the animal's affections; but they were inseparably wedded to his late master, and he took the first opportunity to escape, and regain his lonely situation. With true benevolence, the worthy clergyman permitted him to follow the bent of his inclinations; but to soften the rigour of his fate, he built him a small kennel upon the grave, which was replenished once a day with food and water. Two years after did this mirror of fidelity pass in this manner, till death put an end to his griefs."

THE mind of a child is not like that of a grown person, too full and too noisy to observe everything: it is a vessel always *ready* to receive, and always receiving.—MRS. CHILD.

THE EVENING PRIMROSE. (*Œnothera biennis.*)

You, Evening Primroses, when day has fled,
Open your pallid flowers, by dews and moonlight fed.—BARTON.

THIS North American flower was first sent from Virginia to Padua, in the year 1619, but at what exact period it reached England is uncertain, since Parkinson is the earliest author who notices it; but it must have been some time previous to 1629, as in his "Garden of Pleasant Flowers," which was published in that year, he speaks of it in a more familiar style than he would have done had it been of late introduction. This author calls it Tree Primrose of Virginia. This plant bears its primrose-coloured flowers on branches of three or four feet in height; and hence it was called Tree Primrose, and Evening Primrose, or evening Star, because the flowers burst open and expand in the evening, generally between six and seven o'clock.

We have frequently stood over this plant to watch the expansion of its flowers, the petals of which are confined together by means of the calyx, the ends of which meet over the corolla, and clasp each other by a hook. As the corolla swells in its confinement, the segments of the calyx separate at bottom, and discover the primrose corolla, which appears to be gradually inflating with a gaseous fluid, until it acquires sufficient expansive force to burst the hooks of the calyx. When its petals are thus freed, they expand instantaneously to a cup shape, and in about half an hour after they progressively spread until they become quite flat: by the morning the flowers become flaccid, so that the impregnation must take place after sunset.

The Great-flowered Evening Primrose, *Œnothera grandiflora*, is also a native of North America, and was introduced to our gardens in the year 1778, by John Fothergill, M.D. This species possesses an agreeable fragrance, and hence it is more esteemed than the *biennis*.

These biennial plants are raised by sowing the seeds in autumn, on a border, where the plants should remain until the following autumn, when they may be removed to the situations where they are intended to flower the following summer. In removing them, care is required to avoid breaking the roots, which run deep into the ground. The common kind will grow in almost any soil and situation, but the *grandiflora*, being more delicate, requires a south aspect and a free light earth.

The Sweet-scented or Curl-leaved Evening Primrose, *Œnothera odorata*, is a plant of late introduction, which, from its delightful fragrance and hardy nature, is likely to supersede the other species, so as to banish them from the best gardens. We are indebted to the late Sir Joseph Banks for this species of Œnothera, he having purchased the seeds amongst others, which had been collected by the Surgeon of a merchant-ship, on the coast of Patagonia. The plants were first raised in Europe in 1790.

This proves to be a tolerably hardy perennial plant, growing freely in most situations, and producing plants wherever the seed scatters itself. The stem does not die completely down, even in the open air, and when protected in a conservatory, it becomes an evergreen shrub, singular by its waved foliage, beautiful by its yellow blossoms, delightful for its perfume, and curious because its flowers only open,

When weary peasants, at the close of day,
Walk to their cots, and part upon the way;
When cattle slowly cross the shallow brook,
And shepherds pen their folds, and rest upon their crook.
CRABBE.

[PHILLIPS' *Flora Historica.*]

THE DIVING-BELL.

No. II.

Spalding's Diving-Bell.

We concluded our last article on this subject with a detailed account of Dr. Halley's diving-bell. We now proceed to notice the machines of subsequent improvers, together with some of the important submarine operations performed by means of improved apparatus.

The first improver on Halley's diving-bell was Mr. Triewald, the military architect to the King of Sweden. This bell was on a smaller scale, less expensive, and more easily manageable than Halley's bell. It was adapted for a single diver only. The bell was made of thin copper plate, tinned on the inside and strengthened by bands of iron hoop encompassing it in different directions. It was suspended by a rope from a ring at the top of the bell, and caused to sink perpendicularly by weights suspended from the bottom hoop, as well as by a large iron ring or plate, suspended at such a distance from the bottom of the bell by chains, that when the diver stands upright with his feet upon this plate, his head is above the water in the bell. This situation is better than if his head were in the top part of the bell, the air being cooler and purer near the surface of the water than higher up, because the air which has been breathed is heated, and rises to the top; but when it is necessary for the diver to rise into the top of the bell, means are provided for enabling him to inhale the cool air from the bottom near the water. A spiral copper tube is placed round the inside of the bell, the lower end opening in the bottom of the bell, and the upper end provided with a flexible leather tube ending in an ivory mouth-piece for the diver to hold in his mouth and inspire the air from below; whilst at every expiration he expels the air through his nostrils into the upper part of the bell. This bell may be supplied with fresh air from barrels in the same manner as Dr. Halley's; and is therefore provided with a cock in the top to allow the impure air to escape when a supply of fresh air is obtained. The bell is illuminated by four strong lenses in the top, each provided with copper shutters to defend them from accidents when on shore.

About the year 1776 Mr. Spalding, of Edinburgh, considerably improved the diving-bell, and was rewarded by the Society of Arts for his inventions. Mr. Spalding was practically acquainted with Halley's bell, in an endeavour to recover some of the property of a vessel which had been wrecked on Scares, or as they are also called, the Fern Islands, two years before. This dreadful accident occurred in the night, and all the crew perished. Some of the light goods were thrown on shore, and the heavy and more valuable packages it was thought might be recovered by diving. The surviving owners of the ship intrusted the whole management of the undertaking to Mr. Spalding. His first experimental trials were made in the Leith Roads at depths varying from 5 to 8 fathoms, and, having thus brought his apparatus into working order, he sailed for Dunbar in an open sloop, rigged, of about eight tons' burden. He had been informed that the bottom of the Fox ship of war lay there, but he could get no certain intelligence, since that vessel perished in the night, with all on board, somewhere in Dunbar bay; and by storms, during so long a period as thirty years, was thought to be sanded up. Wishing, before he proceeded to Scares, to make some experimental trials, he descended at a spot where it was probable the Fox lay: but in seven or eight fathoms' water he found only a hard sandy bottom, and no trace of the lost vessel. He made other experimental trials on a vessel sunk at Dundee, and went down three different times, changing the ground each time; and at length fell in with the stump of the wreck, sunk five fathoms deep at low water to a level with the soft bed of the river, which is composed of a light sand intermixed with shells. The chief parts of this wreck were supposed to have been carried away by an immense body of ice the year before. Mr. Spalding found that the muddiness of the river occasions so great a darkness at only two fathoms from the surface, that objects cannot be seen: and from the smallness of his bell, which contained only forty-eight gallons of air, it was impossible to have a candle burning in it, because the flame would vitiate the air too rapidly to enable any man to work, and at the same time to pay attention to receiving the necessary supplies of air.

It will be understood that these trials were only preparatory to the undertaking at Scares, where Mr. Spalding expected to find many dangers and difficulties resulting from a stormy sea and an unequal rocky bottom: but in the above trials, in which the machinery was altered in various ways as experience suggested, so much time had been lost, and the weather became so stormy, that he was obliged to wait at Bamborough Castle some time for favourable weather. He then sailed to Scares with his brother, three sailors and two pilots. It was four o' clock in the afternoon, about high water, when he went down at a small distance from the place where he judged the wreck to lie. The depth was about ten fathoms. He fortunately alighted on a flat part of the rock, near a dreadful chasm; and had gone only two steps with his machine, when the two pilots became so greatly terrified, that in spite of his brother's entreaties, they hoisted up the bell before he had time to examine anything around him. On coming into the boat, the pilots remonstrated on the danger of the machine being overturned either on the wreck or the rocks, and also on the impossibility of raising any of the heavy goods with so small a purchase in an open boat, and in a place, where, at this season, no larger vessel would venture to lie; as the nights were then so long, and only two passages for a small vessel to run through, in case of a gale of easterly or southerly wind,—one of the passages being extremely narrow, and both of them dangerous.

Mr. Spalding, therefore, convinced that with an open boat nothing could be accomplished, and that, except in June and July, no man would risk himself in a sloop for two or three days at anchor in such a place, was compelled to abandon his project; yet he determined to take a view of the guns of a Dutch ship of war, lost in the year 1704; and as they lay two or three miles nearer the land, the project was less difficult, especially as the weather continued favourable. Mr Spalding says:—

> Having procured all the intelligence possible, we went to the place, where I went down four different times, but could find no marks of any wreck, notwithstanding my walking about in five and six fathoms water, as far as it was thought safe to allow the rope to the bell; continuing generally twenty minutes each time at the bottom. On this occasion I was obliged to carry a cutting-hook and knife, and clear away the sea weeds, which at this place are very thick and strong; without this method I could not move about. At the fifth going down, each trial being made in a different place, I was agreeably surprised to find a large grove of tall weeds, all of them from six to eight feet high, with large tufted tops, mostly in regular ranges, as far as the eye could reach,—a variety of small lobsters and other shell-fish swimming about in the intervals.

He then discovered the place where one of the cannons lay; but was too much exhausted, by having

been down at intervals for near three hours, to attempt bringing it up.

In these descents Mr. Spalding discovered two very serious dangers attendant on the use of Dr. Halley's form of diving-bell. *First:* the sinking or rising of the bell depends entirely upon the people who are at the surface of the water; and as the bell, even when in the water, is very heavy, the raising of it requires not only a great deal of labour; but there is the chance of the rope, by which it is raised, breaking; and thus every person in the bell would certainly perish. *Secondly:* in many places of the sea are rocks which lie at a considerable depth, the figure of which cannot be discerned from above. There is danger that some of their rugged prominences may catch hold of one of the edges of the bell in its descent, and thus overturn it, before any signal can be given to those above. Such an accident would be attended with the destruction of the divers, especially as it must always be unknown before trial what kind of a bottom the sea has in any particular spot.

Mr. Spalding therefore made such additions and variations to Halley's bell, as to obviate the above defects. The accompanying figure shows Mr. Spalding's diving-bell. Its body was made of pipe-staves, five feet long, five feet in diameter at the bottom, and two and a half at top. It was suspended by four ropes, affixed to hooks on the sides of the bell, and meeting at the top, where the hook of the great rope takes them. Ballast-weights, suspended from hooks on the outsides serve to keep the mouth of the bell always parallel to the surface of the water. By these weights alone the bell would not sink; another is therefore added, which can be raised or lowered at pleasure, by means of a rope passing over a pulley, and fastened to one of the sides of the bell.

The second objection to Halley's bell,—viz., the chance of the suspending rope breaking, was fully met by the ingenuity of Mr. Spalding. He so contrived that the divers themselves could raise the bell, with all the weights appended to it, to the surface, or remain stationary at any desired depth; so that, even should the suspending rope break, the divers would be safe.

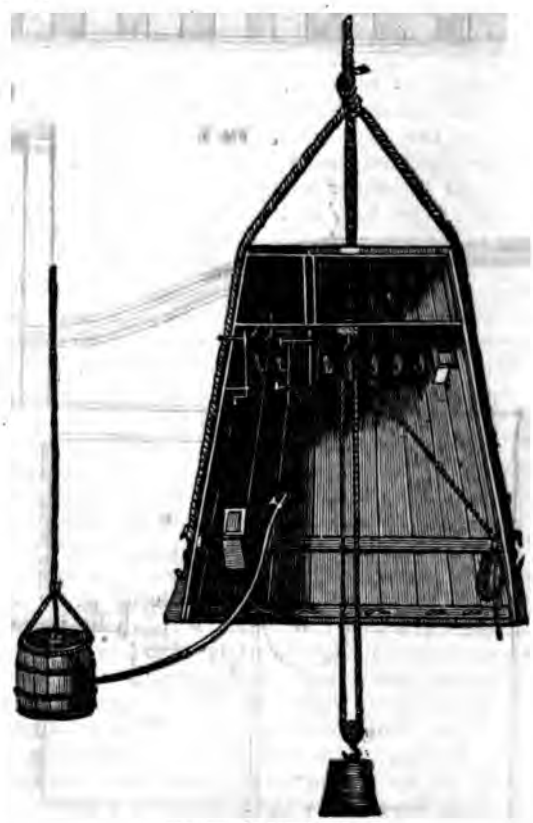
In Mr. Spalding's bell, the divers sit on ropes, instead of wooden seats: the light is admitted through windows of thick strong glass. Fresh air is supplied to the bell by a contrivance similar to that of Halley's, and the hot air is discharged by a small cock, as often as it is found necessary.

The next great improver of the diving-bell is Mr. Smeaton. About the year 1779 he substituted for the air-barrels of Halley, a forcing air-pump, situated above the surface of the water; by means of which a continued stream of air was poured into the bell, along a pipe, without any trouble or attention on the part of the divers. Mr. Smeaton, with his improved apparatus, was the first to introduce the diving-bell into engineering operations, in which it has since rendered such essential service.

Mr. Smeaton did not greatly alter the form of the diving-bell until 1788, when, being employed on some works in Ramsgate-harbour, he introduced an entirely new bell, which is the form of apparatus adopted up to the present day. This bell consisted of a square chest of cast iron, four and a half feet long, of the same height, and three feet wide, capable of holding two men, and cast so thick as to sink by its own weight. The pump for supplying fresh air was placed in a boat by itself, and kept in continual action. This air was conveyed to the bell by a flexible tube, which allowed the bell to be moved up or down, or in any direction independent of the motion of the boat. The bell contained about fifty cubic feet of air, sufficient to support life for two persons for about an hour, independent of any supply from above; so that should any accident happen, there would be time to rescue the divers.

Mr. Smeaton also so arranged the tackling of his diving-bell, as to allow of its being moved about while under water within certain limits. The directions for moving it were given by the divers, and communicated to those above, by striking with a hammer on the inside of the bell. Water conducts sound with great facility, and the blows of a hammer are audible at very considerable distances, and have a peculiar character which prevents their being mistaken for other sounds. The directions of the divers were conveyed by the number of blows previously agreed on. One blow, for instance, denotes "more air:" two, "stand fast:" three, "heave up:" four, "lower down:" and so on.

The construction of Ramsgate harbour, and the constant employment of the diving-bell therein, brought out fully the capabilities of this admirable invention. It would lead us too far, were we to detail the many ingenious plans adopted in the use of the diving-bell in submarine structures. Suffice it to say, that it has been used successfully and extensively in many of the harbours of this and other countries, and that with a safety and precision, which mark the almost perfect state of machines in general; which we may call the children of that prolific mother, necessity—children who pass successively from one foster-father to another, schooled, disciplined, and improved by all, and finally occupying a position among our national resources, which, at its birth, was never anticipated.



SPALDING'S DIVING-BELL.

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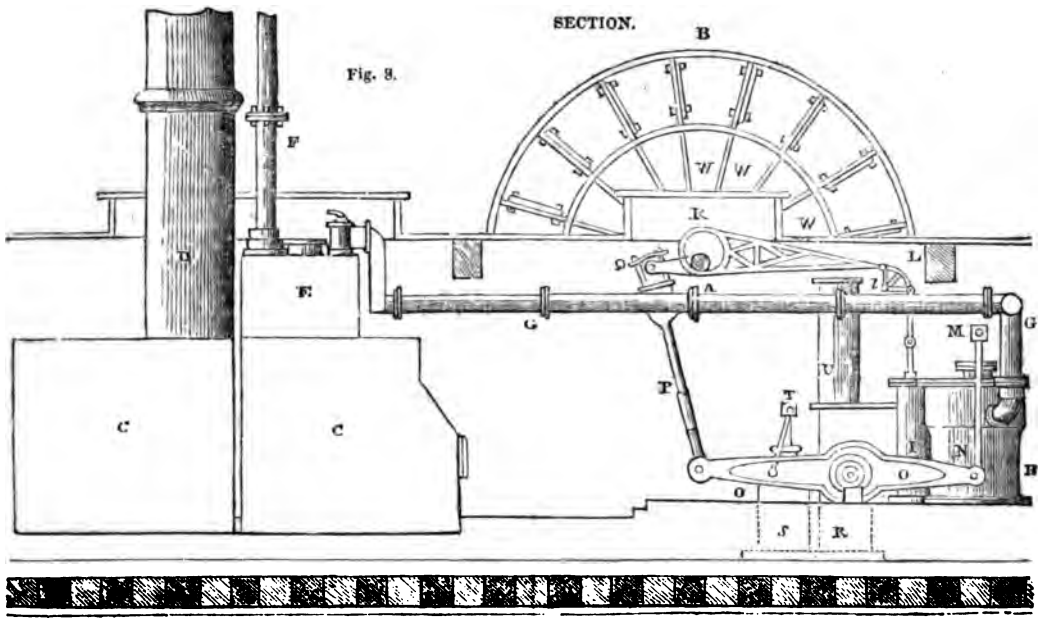
A BRIEF HISTORY OF NAVIGATION. PART VI.

CONCLUDED

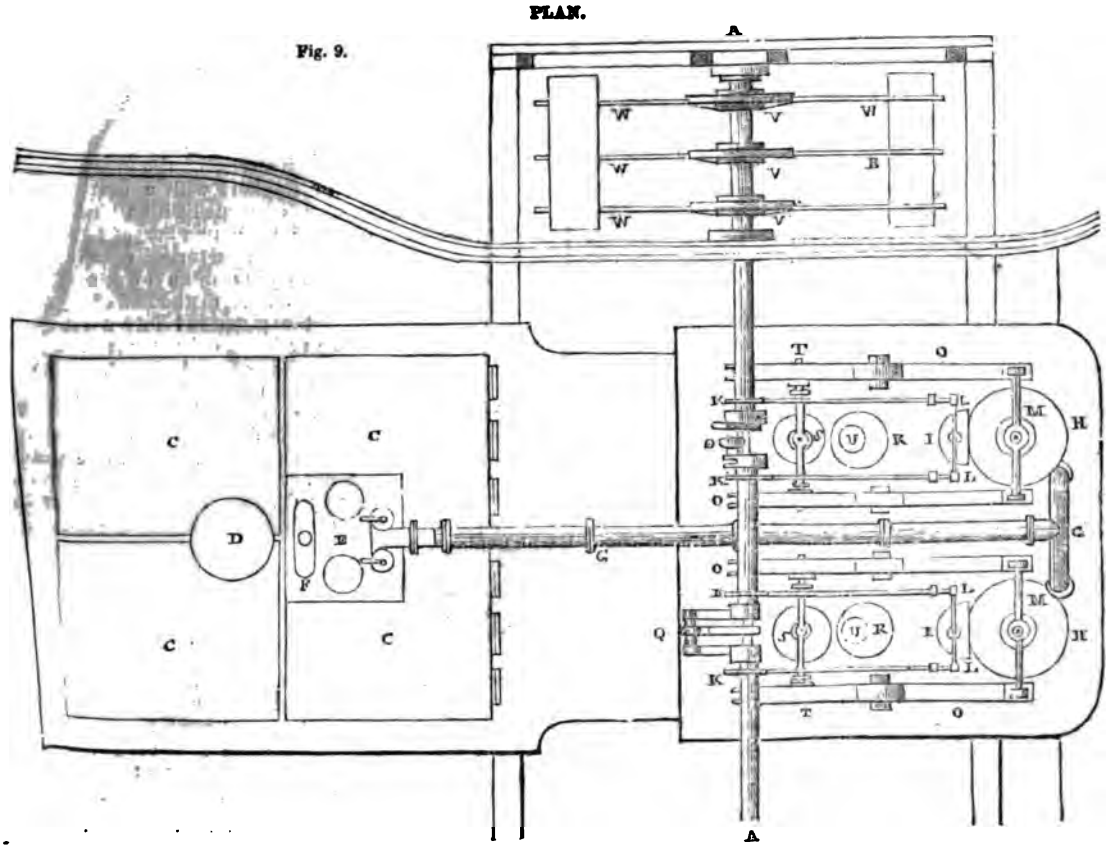
SECTION.

Fig. 8.



PLAN.

Fig. 9.



SECTION AND PLAN OF THE WORKING PARTS OF A STEAM-BOAT.

ON STEAM NAVIGATION.

Soon shall thy arm, unconquer'd Steam! afar
Drag the slow barge, or drive the rapid car:
Or, on wide-waving wings expanded bear
The flying chariot through the fields of air.—DARWIN.

THE Steam-Engine is one of the grandest inventions of modern times; not only on account of its gigantic force as a *prime* mover, but also on account of what may be termed its flexibility; for there is, perhaps, scarcely an art or trade, wherein machines, whether of a simple or complicated character, require to be set in motion, but can receive that motion from the steam-engine in a far more perfect and effective manner than through the agency of any other force. But none of the applications of this noble engine surpass, in usefulness or important results to the great human family, its application to Navigation. It has afforded new and wonderful facilities to the trade and intercourse of the civilized world in general, and this country in particular; and all our means of communication, whether by sea, by river or canal, have been multiplied to an almost indefinite extent. "From the earliest times, (says a modern writer,) mankind have been baffled by the uncertain elements of the winds and waves: by these a barrier was raised to the progress of navigation, which the boasted improvements of modern times were never able to overcome; and the proverbial uncertainty of a sea voyage, continued accordingly, to be ranked among the irremediable evils of life. Hence it was, that when a voyage of a few miles might be protracted to several days, those great rivers and inlets of the sea, which penetrate far into the land, instead of being of unrivalled utility to commerce, formed rather a drawback, in many cases, to our internal communications; while with respect to rivers, no attempt could be made, with the least advantage, to navigate them against the stream. We possessed no power that could accomplish this object. The use of a river, as an instrument of internal intercourse, was, in consequence, much limited; and no craft were ever found to ply on any of the great streams, because they could only make their way in one direction. They were useless, except for this single purpose; and in all countries the water communications were in a manner mutilated, and imperfect."

In illustration of these remarks, it may be instanced that on the great river Mississippi, which flows at the rate of five or six miles an hour, it was the practice of a certain class of boatmen, who brought down the produce of the interior of New Orleans, to break up their boats, sell the timber, and return home by a slow and toilsome land-journey; since a voyage up the river, from New Orleans to Pittsburgh, (about 2000 miles,) could scarcely be accomplished, with any degree of labour, under four months.

But now, Navigation needs no longer be impeded by the uncertain action of the wind, or the opposing effort of the tide: we have a new power, which is perfectly manageable, and acts in both directions, almost with equal efficacy. The four month's voyage from New Orleans to Pittsburgh is now performed with ease in less than twenty days. Voyages which were once uncertain and tedious, can now be performed with all the ease and expedition of land-journeys. Rivers which were once solitary, are now crowded with vessels: the small towns and villages on their banks have grown up into cities teeming with commercial abundance. The opposing waters cannot resist the passage of the steam-boat, which is now to be seen on almost every river in the world. The steam-boat plies regularly on almost every river in the United States: it has long been known on the Ganges, and other great rivers of the East. The rivers, lakes, inlets, and narrow seas of Europe, are the constant resort of this ubiquitous locomotive; and, in the internal navigation of our own country, it has taken the place of most other vessels. The intercourse of Britain with Ireland, with France and the continent generally, and now even with America, is carried on by means of the steam-boat. The aspect of many countries, and the habits and intelligence of the people have been vastly ameliorated by the free intercourse with the agents of moral, intellectual, commercial, and social improvement, which Steam-Navigation has supplied.

In proceeding to supply the general reader with an account of Steam-Navigation, we propose to divide our subject into three parts:—*First*, a brief history of the origin, rise, and progress of Steam-Navigation. *Secondly*, a popular view of the wondrous agent which acts as the *prime mover of the* Steam-boat. And *Thirdly*, a detailed account of the application of the Steam-engine to the purposes of Navigation.

I. The idea of propelling vessels by paddles fixed to the circumference of a wheel is by no means modern. This mode, as a substitute for oars, is mentioned in a curious work, *De re militari*, by Valturius of Rimini. It was first printed by John of Verona in 1472, and is a very fine and ancient specimen of typography and wood engraving. One of the machines described in this book is a flat-bottomed boat, which might be impelled across a river by vanes of pitched sail-cloth, fixed to axles and turned round by men, by means of winches or cranks. These vanes, or paddles, dipped into the water, and when they were moved through that fluid, its reaction forced the boat in the contrary direction. They served as fins to fishes, or as wings to birds and insects; and the author of the above treatise states that one of these paddle-wheels was equal in efficacy to twelve oars; but then it would probably require as much force to move it, so that nothing would be gained by substituting the paddle for the oars: on the contrary, where human force was used, the oars would have the advantage. It is obvious that some modes of employing the strength of a man or an animal are much more advantageous than others, because they allow more of that strength to be profitably turned to account; besides, the best mode of employing the strength of one kind of animal is often the worst for another. For example, the force of a horse is employed most economically in drawing, while that is one of the very worst ways of employing a man's strength. Now, although turning a winch or crank has been proved to be a very advantageous way for employing human power, yet the action of rowing is undoubtedly better; in fact, rowing is the most economical method in which a man can possibly exert his strength; but when any other power is employed, the paddles have the advantage, because they simply require animal or mechanical power, whereas rowing requires not only force but skill. This advantage of paddles is more especially remarkable when any inanimate power, such as steam is used; for then that motion is best, which is most simple. Now the motion of an oar in rowing is rather complicated, while a mere circular rotation, like that of the paddle-wheels, is very simple, and is, perhaps, more easily produced by machinery than any other kind of motion. One advantage of the paddles, when human force is employed, is that any number of persons can work together at the crank of a paddle, while an oar cannot conveniently be managed by more than one.

The first proposition to drive vessels against the wind by the force of steam, was made by Papin, a Frenchman, who is regarded by his countrymen as the inventor of the steam-engine, and he certainly did contrive an engine worked by steam. He had been much struck by the great success of an experiment made in England with a boat driven by paddle-wheels, which were connected with a kind of windlass on the vessel, turned by a number of horses. He thought that the paddles might be turned equally well by the rod of a piston worked up and down by steam, and for this purpose he contrived a rude method of changing the reciprocating motion of the piston-rod into a continuous circular rotation; but he probably did not carry the project further than making a working model of such a boat. In 1730, a work was published by Dr. John Allen, entitled, *Specimina Ichnographia, or a brief Narrative of several New Inventions.* It contains descriptions of several plans for driving vessels by oars or paddles, worked by a windlass or capstan; and also a new plan of his own, in which a quantity of water is pumped into the vessel and then forced out at the stern in a continuous stream,—the re-action of which forced the vessel along, in the same manner as a rocket is forced up by the re-action of the air against the stream of ignited substances which rush out at its lower end. Dr. Allen constructed a large boat of this kind, in which the pumps were worked by men, but he suggests that the labour might be more advantageously performed by a steam-engine. Some years before this, the atmospheric steam-engine had been brought to a considerable degree of perfection by Newcomen, and was used for the purpose of draining coal-works. This same plan of Dr. Allen for propelling vessels, by sucking in water at the head and forcing it out at the stern, has since been revived and patented by several individuals.

In 1737, a tract was published by Jonathan Hulls, entitled, *A Description and Draught of a new Invented Machine for carrying Vessels or Ships out of any Harbour, Port, or River, against Wind or Tide, or in a Calm.*

Printed for the Author, and sold, price Sixpence, at the pamphlet shops of London and Westminster. This is generally considered as the first attempt at steam-navigation. The following is an extract from the treatise, and shews the principle on which his engine acted. "In some convenient part of the tow-boat, there is placed a vessel about two-thirds full of water, with the top close shut; this vessel being kept boiling rarifies the water into steam; which, being conveyed through a large pipe into a cylindrical vessel, and there condensed, makes a vacuum, which causes the weight of the atmosphere to press on the vessel, and so presses down a piston that is fitted into this cylindrical vessel, in the same manner as in Mr. Newcomen's engine, with which he raises water by fire. It has been demonstrated, that when the air is driven out of a vessel of thirty inches diameter, the atmosphere will press on it to the weight of four tons, sixteen hundred weight, and upwards: when proper instruments for this work are applied to it, it must drive a vessel with great force." If Hulls did not make the first steam-boat, he certainly first proposed the means of turning paddle-wheels by the force of steam, and exactly in the manner now employed, namely, by means of the crank, a most simple and beautiful contrivance for converting a reciprocating motion into a circular one.

No other attempt at steam-navigation appears to have been made for a long time, until the stationary land-steam-engine had been improved, and brought almost to perfection, by Watt, and had been applied to the moving of every kind of machinery for manufacturing purposes.

The next person who turned his attention to the subject was a M. Perier, who, in 1775, tried a small boat, or rather model, on the Seine; but though it succeeded, its motion was very slow, on account of the small power of the engine. He did not, however, pursue the attempt.

In 1781, the Marquis de Jouffray made several experiments on the Saone, at Lyons, with a boat no less than 140 feet long. He was not very successful, owing to various accidents which occurred, but his investigation was soon stopped by the Revolution, which drove him from his country. The subject was now taken up nearly at the same time in Italy by M. Serratti, in Scotland by Mr. Miller, and in America by two rival competitors, James Rumsey of Virginia, and John Fitch of Philadelphia. Mr. Miller had been induced to make the attempt by seeing a model of a steam-carriage made by William Symington. It struck him that the paddle-wheels of a boat might be turned in the same manner as the wheels of a carriage, and he accordingly directed Symington to construct a similar engine to work a boat. This having succeeded very well on a small scale, he tried a much larger boat on the Forth and Clyde canal, but it was found that the disturbance of the water occasioned by the paddles destroyed the banks of the canal. Mr. Rumsey's first steam-boat was about fifty feet in length, but the engine occupied a very small space, the boiler holding only five gallons of water, and the daily consumption of fuel was only four to six bushels of coals. Nevertheless, the boat moved at the rate of three or four miles an hour when loaded with three tons, in addition to the engine which weighed one-third of a ton; it worked a large pump by which water was drawn in at the bow and forced out at the stern, as in Dr. Allen's proposition. His next project was to move the boat by long poles, pushed against the bottom of the river by the power of the engine. Fitch's boat was propelled by paddles like the modern steam-boat, but there was a great deal of rivalry between these Americans; the invention finally proved the ruin of Fitch, and he at last abandoned the undertaking. It was afterwards taken up by a great number of Americans and others, but no attempts can be considered completely successful till the time of the celebrated Robert Fulton, who is commonly considered as the father of steam-navigation. He was born in the year 1765 in the town of Little Britain, county of Lancaster, state of Pensylvania, and showed a taste for mechanics at an early age; he got his livelihood by portrait-painting, and lived several years in London with West, who patronized him. After this he lived at Exeter, and was acquainted with Lord Stanhope and the Duke of Bridgewater, the celebrated founder of the canal which is known by his name.

It was here that he was first induced to turn his attention to the improvement of navigation. He afterwards removed to Birmingham, and then to Paris, where he made many successful experiments in steam-navigation. He met with no encouragement, however, in France. He made an offer to Buonaparte, to provide steam-boats for the flotilla, with which he was about to invade England, but was rejected. In 1795, he published a treatise on Canals. He at length left France, finding he could not practise steam-navigation, owing to a patent that had been obtained by M. de Blanc, for steam-boats. He therefore returned to his native country, across the Atlantic; but here also the exclusive privilege had been granted in 1798 to Mr. Livingston, for navigating by steam all the waters in the state of New York. But an act was passed on the 5th of April, 1803, by which this right was extended to Mr. Fulton for twenty-one years. It had been granted, however, to Livingston, only on condition that he would, within two years, produce a steamer of twenty tons burden, that would run at the rate of four miles an hour. The time allowed for this purpose was afterwards extended to April, 1807. Livingston failed in accomplishing this, because he did not employ engines of sufficient power; but in 1807, Fulton finished his first American steam-boat, and worked it by means of an engine of twenty horse-power, sent over from England, from the manufactory of the celebrated Boulton and Watt. Fearing the expense might exceed his means, he offered one-third of his patent right to several gentlemen, on condition that they would contribute a similar portion of the expenses, but he could get no one to accept his offer before the experiment was made; though since that time so many have grasped at the profits derived from this invention of himself and his descendants. This boat afterwards plied regularly between New York and Albany, a distance of 120 miles, which was performed at an average rate of five miles an hour. The following account of its first voyage, extracted from Colden's life of Fulton, may be interesting.

"In the spring of 1807, the first Fulton boat built in America, was launched from the ship-yards of Charles Brown, on the East River. The engine from England was put on board of her; in August she was completed, and was moved by her machinery from her birth-place to the Jersey shore. Mr. Livingston and Mr. Fulton had invited many of their friends to witness the first trial. Nothing could exceed the surprise and admiration of all who witnessed the experiment. The minds of the most incredulous were changed in a few minutes; before the boat had made the progress of a quarter of a mile, the greatest unbeliever must have been converted. The man who, while he looked on the expensive machine thanked his stars that he had more wisdom than to waste his money in such idle schemes, changed the expression of his features as the boat moved from the wharf, and gained her speed: his complacent smile gradually stiffened into an expression of wonder: the jeers of the ignorant, who had neither sense nor feeling enough to repress their contemptuous ridicule and rude jokes, were silenced for the moment by a vulgar astonishment, which deprived them of the powers of utterance, till the triumph of genius extorted from the credulous multitude which crowded the shores, shouts and acclamations of congratulation and applause. This far-famed vessel, which was the *Clermont*, soon after sailed for Albany, and on her first voyage arrived at her destination without any accident. She excited the astonishment of the inhabitants of the shores of the Hudson, many of whom had never heard even of an engine, much less of a steam-boat. She was described by some, who had indistinctly seen her passing in the night, as a monster moving on the waters, defying the winds and tide, and breathing flame and smoke. She had the most terrific appearance from other vessels which were navigating the river, when she was making her passage. The first steam-boats, as others yet do, (*in America,*) used dry pine wood for fuel, which sends forth a column of flame, many feet above the flue; and whenever the fire is stirred, a galaxy of sparks fly off, which in the night have a brilliant and beautiful appearance. This uncommon light first attracted the attention of the crews of other vessels. Notwithstanding the wind and tide were adverse to its approach, they saw with astonishment that it was rapidly advancing towards them; and when it came so near that the noise of the machinery and the paddles was heard, the crews in some instances shrank beneath their decks, from the terrific sight; and others left their vessels, to go on shore; while others prostrated themselves, and besought Providence to protect them from the approach of the horrible monster, which was marching on the tides, and lighting its path by the fires which it vomited."

As soon as the great success of this attempt became known, steam-boats were rapidly built both in the old and new world. Since the time of Fulton, the practicability of steam-navigation has been placed beyond a doubt.

Almost every possible variation in the structure of the engines has been tried. The consumption of fuel has been greatly diminished; the speed attained by Fulton's first boat has been trebled. The sphere of steam-navigation has been extended from rivers and estuaries to the open sea. Steam-ships have not only become quite common in the seas and channels that surround our island, but have ventured out into the ocean, even in the most boisterous weather; and immense vessels, with engines of 300 horse-power, now ply regularly between Europe and America, across the stormy Atlantic. Our government has also highly patronized and encouraged steam-navigation, by constructing superb steamers, both for the purposes of commerce and warfare.

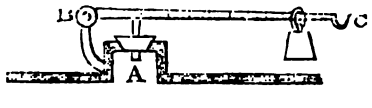
II. Before entering into the descriptive account of steam-navigation, it will be necessary to understand the general principles of the steam-engine, and also a few of the most important properties of steam.

Steam possesses, in common with all other aerial bodies, an expansive or elastic force, by which it always presses outwards, and endeavours to occupy a larger space. It is on this valuable quality of steam that the steam-engine acts. The force of steam or vapour increases according to its temperature. It always rises from water, and even from ice, at all temperatures; but boiling does not commence till the water attains the temperature of 212°, because it is not till then, that the steam becomes sufficiently elastic to overcome the pressure of the superincumbent atmosphere. Although air is an exceedingly light body, yet the atmosphere, or whole mass of air surrounding the earth, reaches so high above the ground, that it presses on every square inch of surface on the earth, with a pressure of 15 lbs. The steam therefore must also possess an expansive force of 15 lbs. per square inch, before it can rise from the water in the form of bubbles; and as steam or vapour below 212° does not possess such a power, water does not usually boil under that temperature. On the top of a high mountain, as there is less atmosphere above it, there is of course less pressure to be overcome, and water accordingly boils at a lower temperature. But at the bottom of a deep mine, there is the pressure of a greater height of air to be overcome, and therefore before the water can boil, the steam must have a greater expansive force, and to effect this, it must be raised to a higher temperature.

This proves that the force of steam or vapour depends upon its temperature, and that steam at 212° has an expansive force equal to the pressure of the atmosphere, or about 15 lbs. on every square inch of surface exposed to it. Steam of a higher temperature than this has a greater force than the air, or exerts a pressure of more than 15 lbs. on every square inch, and such steam is called high pressure steam. Low pressure steam has a pressure of less than 15 lbs. per square inch, and steam of a lower pressure than 212° is of this description.

But the expansive force of steam may be increased also by increasing its density or compactness, and this can be done by confining it in a close vessel, as a steam-engine boiler. The heat of the fire underneath causes steam to be continually given off by the water; but as it can find no outlet whereby to escape, it becomes compressed, its density or compactness is increased, and its tendency to expand is increased in proportion. Its expansive force is continually becoming greater and greater, and if this were continued too long, the boiler would be burst out, by the extreme tendency of the steam to occupy a larger space. To prevent this, an instrument called a safety-valve is used.

Fig. 1.



A small hole is made in the top of the boiler. Suppose A in the above figure to represent this hole. It is stopped air-tight by a valve or little lid, from which springs a stem, which is connected with a bar, B C, moving on a hinge at B. To the other end is hung a weight, by which the valve is pressed down; and it continues down so long as the elastic force of the steam does not exceed the pressure of this weight. But as soon as the force of the steam arrives at that pitch, it raises the valve, in spite of the weight, which it overcomes. A portion of steam then escapes, until the density of the remaining part is so reduced that it can no *longer support* the weight, and the valve falls. Thus, by placing different weights on the bar, the engineer or attendant can regulate the force of the steam in the boiler, and prevent it from exceeding that limit which is consistent with safety. But if the valve be loaded too much, it is no longer a safety-valve; for should the steam acquire a very great elasticity, it will burst the boiler, before it attains sufficient power to lift the valve. To prevent the inconvenience of having many different weights, the longer arm of the bar B C is usually graduated, and only one weight used, which is slid backwards and forwards to the different divisions on the bar, which then acts like a steelyard; for the same weight evidently possesses greater power, in proportion as it is situated at a greater distance from the fulcrum or hinge B.

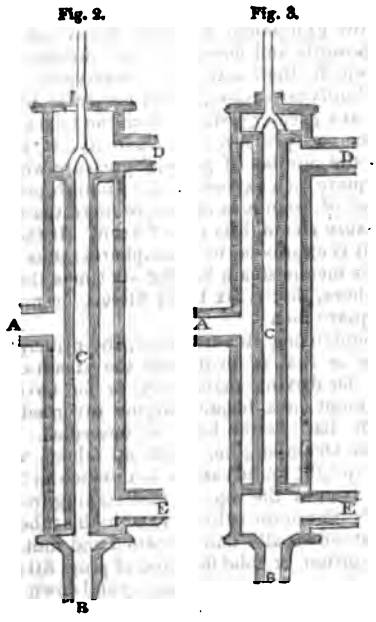
The force, or pressure, or elasticity, of steam, is expressed by the number of pounds' pressure which it exerts on every square inch exposed to it. In high pressure steam, that number of pounds is of course more than fifteen, and in low pressure steam, less than fifteen. If the pressure be very high, it is expressed in atmospheres: thus steam of six atmospheres means steam having six times the pressure of the atmosphere, that is six times fifteen, or ninety pounds on every square inch.

Watt's condensing steam-engine, the principle of which is the same as that of nearly all the steam-engines now used, either for driving machinery, or for navigation, was an improvement on a former engine invented by Newcomen, which had better be first described. The chief part of this steam-engine, as of all others, was an iron cylinder, or upright round case or box, which in Newcomen's engine was open at the top. A tube coming from the boiler entered the bottom of the cylinder, and in this tube was a cock, which the attendant alternately opened and shut. In the cylinder was a piston, or solid flat kind of plug, fitting air-tight into the cylinder, but freely sliding up and down. When the above-mentioned cock was open, the steam rushed from the boiler up into the cylinder, pushing the piston up to the top. But the cock was then shut, and at the same time another cock in the side of the cylinder was opened. This cock was connected with a tube coming down from a cistern of cold water placed above, so that when this cock was opened, a jet of cold water was thrown into the cylinder. This instantly condensed the steam in the cylinder, and caused it to shrink into the form of water, in which form it occupied a very small space compared with its former bulk; which filled the whole cylinder. Thus a vacuum, or empty space, was formed beneath the piston, and the external air pressed the piston down with a pressure of about fifteen pounds per square inch. At the same time the last mentioned cock, (called the injection-cock,) was shut, and when the piston arrived at the bottom of its stroke, the first cock was re-opened, and another portion of steam rushed in from the boiler and pushed the piston up, and the former process was repeated. Thus the alternate opening and shutting of these two cocks, made the piston move up and down with immense force. To make this force available, the piston had attached to it a long rod, the upper end of which was attached to one end of a large beam, which was balanced in the middle like a see-saw. And to the other end of this beam was hung the rod of a pump for draining a mine. The engine also worked a smaller pump, by which the cold water cistern was kept always full. The two cocks were opened and shut, at first by hand, but afterwards by rods attached to the working-beam of the engine.

This form of engine had many great disadvantages, which it was the object of Watt to obviate. The principal defect was the enormous waste of heat caused by the alternate heating and cooling of the cylinder. During the down-stroke the cylinder was necessarily cooled, otherwise the steam would not be all condensed. When the steam entered from the boiler, therefore, the greater part of it was condensed and wasted; for the cylinder had to be first heated to a temperature as high as that of the steam, before the latter could raise the piston. To obviate this, Watt kept the cylinder always hot, and did not condense the steam in it, but drew it off into another separate vessel, in which it was condensed. Another defect was the cooling produced by the great mass of air which rushed down into the cylinder at every down stroke. To obviate this, Watt closed the top of the cylinder, and instead of forcing the piston down by the pressure of the air, he forced it down by steam introduced at the top; and during the up-stroke this steam was drawn off and condensed, as the steam below the piston had been during the down-stroke. This alternate admission of the steam, above and below the piston, is effected by an arrangement called a sliding-valve.

It consists of a box, from which branch four passages. One leads to the boiler, another down into the vessel in which the steam is condensed, another to the top of the cylinder, and the other to the bottom. The internal mechanism of this box is made in various ways. The following is one of the most simple.

Fig. 2. Fig. 3.

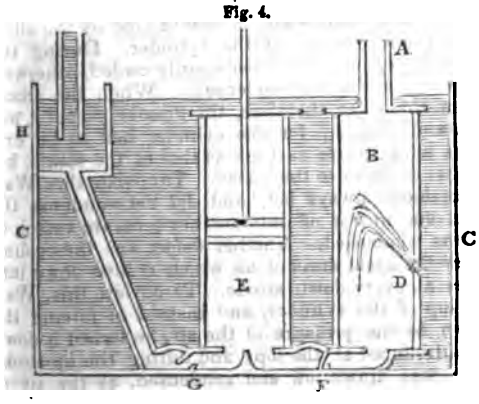


Each of these figures is a section of the valve-box, which is a large tube or cylinder, rather longer than the cylinder of the engine, with which it is connected, both at top and bottom. At A is the opening of the induction-pipe, or that by which the steam enters from the boiler, and at B, that of the eduction pipe, by which the steam is drawn off, after it has done its work. Within this box is a slider, C, which is a smaller tube, open at both ends, and having at each end a projecting rim or collar, fitting air-tight into the valve-box. This has a rod passing out at the top, and worked up and down by the engine.

When the slider is in the position shown in fig. 2, the steam, entering from the boiler at A, passes round on either side of the small tube, C, and escapes at E, into the bottom of the cylinder, forcing up the piston. At the same time, the steam above the piston is forced out through D into the valve-box, and descends by the eduction-pipe, B, into the condenser. But the slider C is now forced up into the position it has in fig. 3, in which the steam from the boiler goes to the top of the cylinder, by the passage D, forcing the piston down; and the steam below the piston comes out through E, and down through B into the condenser. The slider is then forced down again into the position of fig. 2, and another up-stroke is produced.

Let us now see what becomes of the steam after it has left the cylinder. It descends by the eduction-pipe, represented in the following figure by A, into a cylindrical vessel, B, called the condenser.

Fig. 4.

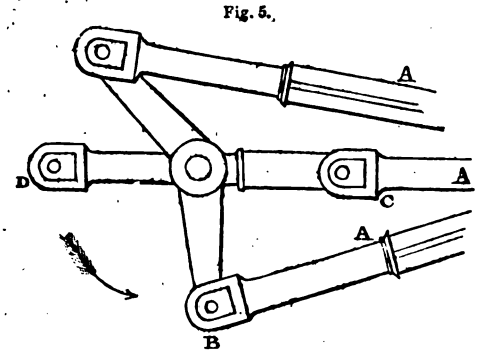


As this vessel must be kept cold, it is immersed in a cistern C C, of cold water, and a jet of water is admitted by the cock D, called the injection-cock. The cistern is always kept full by a pump worked by the engine. When the steam descends into the condenser, the cold causes it to assume the form of water. In order that this hot water, together with the injection-water, should not accumulate in the condenser, it is drawn off by the air-pump E. This is generally constructed like a common pump, but the figure shows another simpler construction. Here, the air-pump has a solid piston, moved up and down by having its rod attached to the working-beam of the engine. At the bottom are two passages containing valves, both opening the same way. When the air-pump piston is drawn up, a vacuum is formed beneath it, and the mixed contents of the condenser open the valve F, and rush in to fill up the void. The air-pump piston is then forced down: the water, &c., below it, cannot escape by the valve F, because it opens only inwards, and therefore it is forced through the other valve G, and up the tube into a small cistern H, called the hot well. It is thence pumped up by another pump, to be returned into the boiler. The cold-water, air, and hot-water pumps are all worked by long rods attached to the working-beam, and from that end of the beam which is furthest from the cylinder hangs a strong rod or arm, working at its lower end a crank on the main axle which turns the machinery. These are the general principles of the steam-engine; but the various contrivances used to gain particular advantages, such as economy of fuel, labour, or attendance, are endless.

III. In marine engines, the principle remains the same; but it is obvious that great alterations must be made in the arrangement and situation of the different parts, that they may be fitted to propel a vessel, and that they may occupy as little room in that vessel as possible.

The mode used for propelling vessels by steam is, as it is well known, by floats or paddle-boards, which resemble in their action the wings of birds or the fins of fishes: they are moved backwards through the water, and the reaction of that fluid in a contrary direction pushes the ship forwards. The paddles are thus moved through the water by being fixed on the circumference of two paddle-wheels, connected by the main axle passing across the vessel; the object of the marine steam-engine is to turn this axle. This could evidently be done by a crank turned by the beam of a common engine, as described above, but it is found more convenient and compact to use a different arrangement. Two separate engines are generally made to exert their force together on two cranks on the main axle, and the chief reason of this is to obviate the great defect which one crank always possesses, which is this:—

Fig. 5.

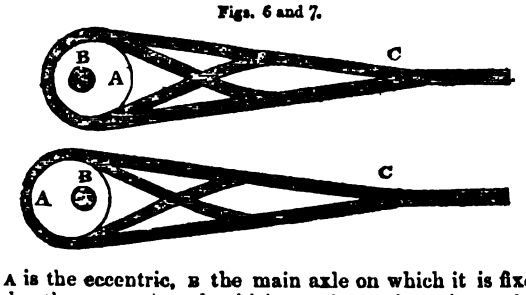


Let this figure represent a crank in different parts of its revolution moved by the crank-rod A: the only motion this rod possesses is backwards and forwards; the end of it has no tendency to describe a circle, but it is obliged to do so, because it is connected with a fixed centre. Now let the crank be at the position B, revolving in the direction indicated by the arrow: the rod pulls it to C; but when it arrives at that point, no mere pulling or pushing on the part of the rod can make the crank revolve, and it is carried past that point only by its own impetus; otherwise, the rod would have as much tendency to push it back to B as in the other direction. The same thing happens at the opposite point D, where no mere pulling would have any effect, were it not for the crank's momentum, or tendency always to revolve the same way. Thus the power with which the crank moves at the different parts of its course is very unequal; and there are two points C and D, called *dead points*, at which the power is almost nothing. In a stationary land-engine this irregularity is equalized by the fly-wheel. This is a large cast-iron wheel, with a very heavy rim, placed on the main axle, which prevents any sudden jolts or

variations in the velocity of the machinery; because the *inertia* of this heavy mass renders it very difficult either to set it in motion or to accelerate its motion, and when it has once been set going, its *momentum* renders it equally difficult to stop or retard it: hence, it possesses such a strong tendency not to alter its state or velocity, that all the little variations in the force of the engine are absorbed, and produce no sensible effect.

But such an arrangement would not be fitted for a marine engine. It is therefore dispensed with, and to serve in its place and equalize the motion, two cranks are worked, which are placed on the same axle, but at right angles to each other; so that when either of them arrives at one of its dead points C or D, the other must be at one of its strongest points, namely B, or the point opposite. Two engines are therefore employed, each moving a separate crank, and having a separate cylinder, beam, valve-box, condenser, and air-pump, but only one boiler; the beam is not placed above the engine as in land-engines, but each cylinder works two beams, placed below it, one on each side. The piston-rod has a cross-piece, or cross-head placed on the top of it, and from the two ends of this piece descend two rods, working the ends of the two beams up and down; the two beams are connected together at the other end by a bar, and from the middle of this bar rises the rod which works the crank on the main axle. One of the simplest forms of sliding valves has been already described; but it was not then stated by what means the slider was moved: this is generally done in steam-vessels by a contrivance called an *eccentric*. This is a small wheel placed on the main axle, and differing from ordinary wheels in not having the axle passing through it exactly in the centre; it is connected with a rod, as shown in the following figures.

Figs. 6 and 7.



A is the eccentric, B the main axle on which it is fixed, and C the eccentric rod, which terminates in a ring or loop which fits on the eccentric. If the axle of this wheel were in its centre, the rod would evidently remain stationary, but this not being the case, the eccentric has sometimes the position of fig. 6, and sometimes that of fig. 7; and thus the rod is moved backwards and forwards through a small space, and this motion is communicated sometimes directly, and sometimes by various levers, to the sliding-valve. The inner surface of the loop at the end of the rod, and the edge of the eccentric, are, of course, ground very smooth, and lubricated with grease or oil, as they are continually rubbing together.

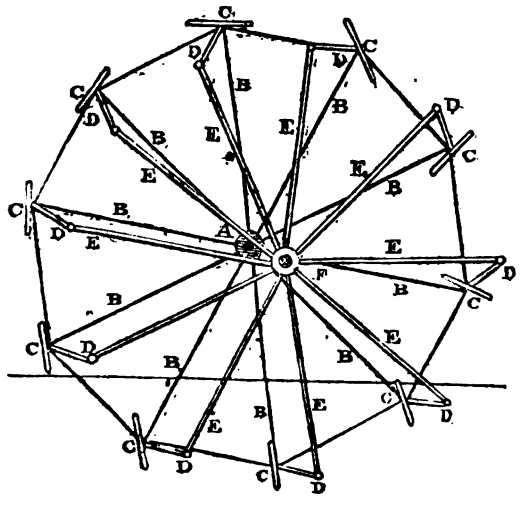
Fig. 8 is a longitudinal section, and fig. 9 a plan of that part of a steam-vessel which contains the boilers and engines, (see frontispiece.) The arrangement is the same as in the government steam-ship Phœnix, of 820 tons' burden, and 220 horse-power, divided between two engines. The letters on both figures are placed at the same parts; A A is the main axle bearing the paddle-wheels B B, to show which the paddle-boxes are removed. In the space occupied by the boilers and engines, the vessel is clear, and has no decks from top to bottom. C C C C are the boilers, which in different vessels vary greatly, both in form, number, and arrangement. In the Phœnix they are four in number, of a square or cubical form, and placed rather behind the main axle. In the plan are seen the fire-places placed along the front of the two front boilers: it has been attempted to place some or all of them behind, that they might be nearer the store of coal, but there was not a sufficient supply of air in that situation. The hot air and smoke circulate through the boilers by means of flues, which wind in various directions before they reach the chimney D: thus little heat is wasted. The four boilers are never used at once, one or two being always reserved to be ready in cases of accidents or repairs in the others. E is a reservoir of steam, on which are the safety-valves, of which there are *now usually two, one of which* has a moveable weight, so *as to be regulated by the engineer*. Thus he can regulate within certain limits the pressure of the steam, and so increase or diminish the power of the engines, and consequently the velocity of the vessel; or he can proportionate the power to the resistance of wind or tide to be overcome, which, of course, varies greatly at different times: but lest he should, through anxiety to increase the rapidity of the vessel, endanger it by overloading this safety-valve, another is provided inaccessible to him, being under a strong case firmly bolted down, but having holes for the escape of the steam. This has a fixed weight, so that the steam cannot exceed a certain pressure; for however much the other may be loaded, the steam will escape by this. F is the *waste-pipe* to conduct off the steam from the safety-valve, and G the main steam-pipe leading to the cylinders H H; each of which is enclosed in a case called a *steam-jacket*. The steam first enters the space between the cylinder and its jacket; and by thus surrounding the former keeps it constantly hot. The steam passes thence to the valve-box I, which is worked by rods as shown in the figure, connected with an eccentric K on the main axle; each engine having two separate eccentrics. But the direction of the motion of the eccentric-rod is backwards and forwards, while that of the sliding valve-rod must be up and down: this change is effected by a small sector L moving on a fixed centre at *l*, to one corner of which is attached the end of the eccentric-rod, and to the other that of the valve-rod. This sector is in its action like those used to change the direction of bell-wires. All the cast-iron framework of the engine is omitted in the figures to prevent confusion. M M in the plan are the cross-heads of the piston-rods, and N in the section is one of the rods by which the beams are worked. O O O O are the beams, only one of which is seen in the section; P is one of the crank-rods, and Q are the cranks at right angles to each other; the condenser is at R and the air-pump at S, in the tank of cold water; the piston of the air-pump is worked by the beams, by means of two rods attached to a cross-piece T, similar to that of the cylinder. The hot well is directly over the condenser, and is a high cylindrical vessel U, open at the top, but made very tall to prevent the water from being scattered by the motion of the ship. Besides the air-pump, which is, of course, always at work when the engines are, there are two others which are only occasionally worked; these are the bilge-pump and the feed-pump for supplying the boiler: they are placed one on each side of the air-pump, and their rods are connected with the beams by moveable bolts or screws, so as to be used only when required: they are not shown in the drawings. Of course, all this apparatus belongs to only one engine, and is therefore doubled on the other side, as seen in the plan; the paddle-wheels have each two bearings, one in the side of the vessel, and the other in the exterior part of the paddle-box. The axle of each wheel has in the Phœnix three small cast-iron wheels, seen at V V V in the plan; into these are fixed the wrought-iron arms or spokes W, each set of which is connected together by two rings at different distances from the centre, as seen in the section. Each paddle is made of a thick plank, and bolted to three corresponding spokes of the three wheels. As it is thought an advantage to throw the main axle and paddle-wheels more forward, the arrangement of the engines is exactly reversed in some vessels, the cylinder being placed behind, next the boilers. To compensate in some degree for the great projection of the paddle-boxes, the vessel is often contracted in width at that part, as seen in fig. 9.

In the common paddle-wheel, the planes of the paddles would, of course, meet in the axis of the wheel; and while they are passing through the water, they have their upper edge always directed to that axis. But it can be mathematically proved, that the effect would be greater, if their upper edges were directed to a point considerably above the wheel. Another defect is, the splashing and sudden shock on striking and entering the water. Now both these defects would obviously be diminished, if the paddles entered and left the water more vertically than they do at present. To effect this, the paddles must have another motion, independent of their rotation with the wheel; and an immense number of new wheels have been proposed for this purpose. But they are nearly all too complicated, and consequently liable to get out of order in the shocks of a rough sea; and there is but one which has been used to any extent. It is termed Morgan's wheel, though it was first invented and patented by Elijah Galloway in 1829; and afterwards improved by William Morgan.

It has been used with great advantage in many government steamers, and is represented in the following figure

The wheel consists of two sets of arms or spokes, each revolving on a separate centre. A is the axle turned by the engine, and has fixed to it, the spokes B B, &c. The extremities of these are joined by straight bars, so as to form a compact polygonal wheel, at the corners of which are placed the paddles C C, &c., which are not fixed, but turn freely on an axis, as seen in the figure. At the back of each

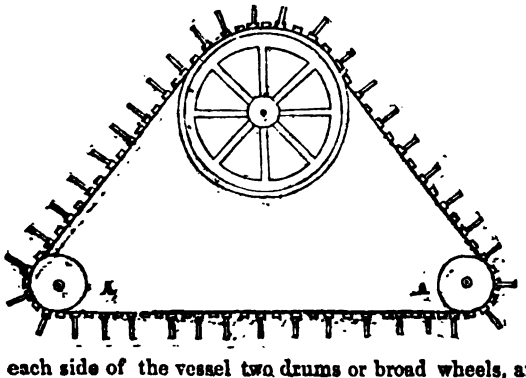
Fig. 10.



paddle is a short arm D, firmly fixed to the paddle at an angle of about 60° or 120°: to the ends of these arms, are connected by joints, the ends of the spokes E E, &c., which turn on a separate centre, F. Now as the wheel revolves, the distance between the points C or the axles of the paddles, and the centre A, is, of course, always the same. Therefore, their distance from the other centre F is always varying. But these two points C and F are always connected together by a jointed rod, consisting of the spoke E, and the short arm D; and to make up for the variation in the distance C F, the angle formed by the two rods D and E varies also. This angle is greatest when the point C is furthest from F, and smallest when those points are nearest to each other. Now as the arm D is firmly fixed to the back of the paddle, it cannot move without moving the paddle also. Thus, the paddle is always changing its position, as it moves round with the wheel; and if the distance and relative situation of the two centres, A and F, be properly adjusted, the paddles will remain nearly vertical during the whole of their passage through the water, and of course, their position when out of the water does not matter. In both the old and new wheels, the less the immersion, or the smaller the part of the wheel that is under water, the more vertically do the paddles enter and leave the water. But this difference is less in the new wheel than in the old, because the upper edges of the paddles are directed to a higher point. Hence the new wheel admits of a deeper immersion than the old, and the superiority of the former is most clearly perceived when both wheels are much immersed; while, when the immersion is small, the difference between the two wheels is hardly perceived.

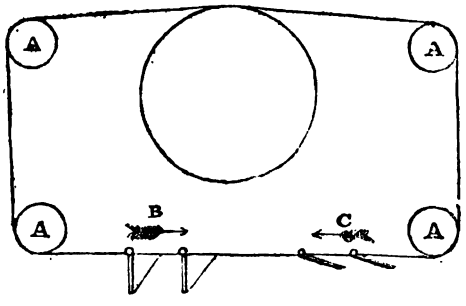
Another method which has frequently been proposed for obviating the defects of the common paddle-wheel, is to have

Fig. 11.



on each side of the vessel two drums or broad wheels, and to fix the paddle-boards to two or three endless chains, passing over these drums. If one or both of the wheels be then turned by the engine, the chains with the paddles will be drawn constantly in one direction through the water. Other methods of effecting this with only one large wheel, may be seen in figures 11 and 12, where A A are small pulleys over which the chain passes.

Fig. 12.



In the last of these is shown the mode in which the paddles must be fixed to the chains, when the large wheel is only moved half way round, so that the chain reciprocates backwards and forwards. If in this case the paddle-boards were firmly fixed at right angles to the chain, when the boards moved forward, the re-action of the water would push the ship back, and thus it would make no progress at all.

The paddles must therefore move on a hinge or joint, so that when they move in the direction of the arrow at B, the resistance of the water keeps them open, and they are kept at right angles to the great chain, by small chains, as seen in the figure; but when they are travelling in the opposite direction, the resistance of the water shuts them up as at C, and of course in that position they produce no effect.

None of these plans, however, have been found practicable, owing to the great friction and liability to get out of order.

But one of the greatest of modern improvements in steam-navigation, is the vibrating engine of Maudslay. It is one of the numerous contrivances to save space; which is, of course, one of the chief objects to be attained in marine engines. In this compact and beautiful arrangement the beams are altogether dispensed with. It might be thought possible to do this by placing the cylinders directly beneath the main axle, and connecting the upper ends of the piston-rods directly with the cranks: but the motion of the piston-rods must be exactly vertical; there cannot be the slightest deviation; otherwise they would fit loose, and not steam-tight, in their stuffing-boxes. But the rotatory motion of the crank would give them a motion backwards and forwards, and, therefore, cannot be applied in this manner, unless the cylinders be made to swing backwards and forwards also, so that the piston shall work parallel with the cylinder, although its upper end describes a circle with the crank. Now in Maudslay's engine this is done by suspending each cylinder on two bearings, or pivots, and allowing it to swing or oscillate like a pendulum. We cannot here, for want of space, enter into a detailed account of this admirable engine, but we will do so in an early number of the *Saturday Magazine*.

One of the greatest difficulties to be overcome in steam-navigation, and especially in long voyages, is the incrustation of salt, lime, and sometimes earth and sand, which accumulates in the boiler; for sea-water is of course used. None of the salts, or other ingredients contained in sea-water, rise in vapour with the steam; they all remain in the boiler, and thus accumulate till the portion of water contained in the boiler can no longer dissolve them, and they are deposited at the bottom and sides; in fact, if some method were not occasionally used to remove it, the boiler would soon become full, and choked with salt. The method commonly adopted is called "blowing out." At intervals, of from two to twenty-four hours, a quantity of hot water is allowed to flow from the boiler, and its place is supplied by water that has been pumped out of the condenser by the air-pump. Now it is obvious that the hot water allowed to escape, contains more salt than the natural sea-water; for its bulk has been diminished by evaporation, while the salt in it remains the same, none of it having been lost. But the water which is introduced in blowing out contains less than its natural portion of salt; for it is composed of the natural sea-water, used for injection water, mixed with the condensed steam, which is of course pure, having been distilled, and having left all its salt and impu-

rities behind in the boiler. By this process, therefore, a quantity of salt is got rid of, but there is also a great waste of fuel; for all the heat contained in the boiling water which has been blown out is wasted: and, after all, the defect is only partially remedied; for still the salt, &c., collects, sometimes in a hard crust, more than an inch thick, and so firm and hard that chisels are required to break it up and remove it, and even the tools are sometimes broken.

This incrustation being a bad conductor of heat, causes a waste of fuel, for the heat passes with difficulty through this thick crust, and the metal of the bottom of the boiler hence attains often a much higher temperature than the water above it; it even becomes sometimes red hot, having a temperature of 800° or 900°, while the water above it has a temperature of less than 300°; hence arises another evil, viz., the unnecessary wear of the boilers by this excessive heat.

In the present mode of working, it would be impossible to carry a sufficient store of fresh or pure water to supply the boiler and condensing cistern, and thus prevent incrustation; but if the steam could be condensed without a jet of condensing water, the water placed at first in the boiler would continually circulate through the engine, without any admixture with any other water, and with no waste except that lost by leakages: thus pure, or at least fresh water, could be always employed in the longest voyages, and with this there would be no incrustation. At the same time, as none of the water of the condensing cistern would enter the engine, that cistern could be kept always full of cold sea-water, which would answer as well as fresh water for the purpose of condensation. A method of condensing the steam without injection-water is, therefore, a great desideratum: and it has been effected by Mr. Samuel Hall, who has taken patents for various improvements in marine engines, but chiefly for a new kind of condenser, in which no jet is required. This condenser consists of a number of small upright tubes, uniting at the top in a flat vessel, into which the steam descends from the cylinder: and at the bottom there is a similar flat vessel, from which the condensed steam is drawn off by the air-pump. As these tubes are immersed in the cold water, the steam when it descends them is exposed to a great deal of cold surface, and is so perfectly condensed without a jet, that the vacuum is thought to be more perfect than that produced in the common condenser: the same water, therefore, continues always to circulate through the engine, so that pure water can be used. As the sea-water of the condensing cistern becomes warmed it is removed, and the cistern kept full by a supply of cold water constantly pumped into it by the engine.

Another great improvement, which bids fair to effect an immense saving of room and fuel, is the contrivance of Mr. Howard, by which the boiler is altogether dispensed with. Its place is supplied by a much smaller wrought-iron vessel, called a *generator*, which is placed over a coke-fire, and contains a quantity of mercury, covered by a very thin iron plate, on which a small quantity of water is thrown in at each stroke of the piston, by an injection-valve and tube communicating with a reservoir of water. The quantity of water thus thrown in, is only just sufficient to fill the cylinder, when vaporized, which it instantly is, because the temperature of the mercury is from 400° to 500°. For every horse-power in this engine, there ought to be about three-fourths of a square foot of surface exposed to the fire; so that for an engine of twenty-horse power, there should be about fifteen square feet of surface. This is the general principle of the improvement; but when all the minor alterations are attended to, the quantity of fuel used is said to be not more than one-third of that required for the common boilers.

In concluding the subject of Steam-navigation, and with it of Navigation generally, we would willingly, did space allow, refer in detail to the surprising achievements of the last year or two in steam-navigation. The details of ocean-steamers generally are, however, well-known; and we may further refer the reader to the fourth volume of the *Saturday Magazine*, p. 232, where he will find a view and description of a large American steamer. But even this vessel is exceeded in all its appointments by the Great Western steam-ship, which we may here briefly notice.

The Great Western steam-ship was constructed by order of a newly-formed Steam-Navigation Company; whose directors have spared no expense to render her a truly magnificent vessel, worthy of trading between two such *great and powerful* countries as England and America. *She was built at Bristol.* Mr. Patterson was the ship-builder: Messrs. Maudslay the engineers, and Mr. Brunel the consulting engineer.

The following are the dimensions of this vessel:—length 236 feet, breadth 58½ feet, and registered admeasurement 1340 tons. The floors are of great length, and overrun each other. They are firmly dowelled and bolted, first in pairs, and then together, by means of one-and-a-half inch bolts, about twenty-four feet in length, driven in four parallel rows, scarfing about four feet. She has stowage for 800 tons of coal, or coal and cargo combined, without encroaching upon her provision and water-room for three hundred people. Besides ample space for officers and crew, (comprising about sixty persons,) there are state-rooms, &c., for 128 first-class passengers. There are also twenty good secondary berths; and should it be found necessary or desirable hereafter to dispense with cargo-space altogether, about one hundred more sleeping-berths might easily be arranged. Such of her timbers as may be exposed to alternations of moisture and dryness, have been prepared by Kyan's process; and every effort has been made to combine the excellencies of naval architecture and engineering, with attention to the comforts of passengers, and to the general facility of quick travel.

The steam-engines are the two largest that have yet been made: they are equal to 450 horse-power. The boilers, of which there are four, are so constructed as greatly to economize steam, fuel, and space: each can be worked independently of the others; while, by means of passages left between them, the engineer can cool, examine, or repair, those not in use.

The saloon of this superb vessel is, together with the other internal decorations, said to be in elegant taste. The length of the saloon is seventy-five feet; the breadth is twenty-one feet, exclusive of the recesses on each side, where the breadth is thirty-four feet; the height is nine feet clear of the beam; and fifty of the pannels are adorned with paintings by Mr. Parris.

The arrangement of the bells, from the various cabins to the steward's room, is new and ingenious. In this room are two small boxes, each containing a bell communicating by means of wires to every part of the vessel. When a passenger pulls the bell-rope, the bell in the small box rings, and at the same time, by means of a small lever, there is forced up through a slit in the box a tin label with the number of the room painted on it, where the services of the steward are required: the label so remains, until the steward has inspected it, and pushed it down again; so that, instead of having the noise and inconvenience of a vast number of bells, there are only two, and the sound of these is stifled by being enclosed in boxes.

Such, then, is a very brief description of one of the finest steam-vessels ever constructed.

We now close the subject of Navigation, which has occupied us thus far. If, in our progress, we should seem to have been too intent on describing the works of man and his progress over the waters of the globe, let not the reader fail to bear with us an humble tribute of gratitude and praise to that Great Power "who hath measured the waters in the hollow of his hand, and meted out heaven with the span, and comprehended the dust of the earth in a measure, and weighed the mountains in scales, and the hills in a balance."—Isaiah xl. 12.

LONDON:
JOHN WILLIAM PARKER, WEST STRAND.

was taken up seriously. An expedition was sent out, which established an infant colony, and in 1608 built Quebec, which has ever since been the principal town in the colony. The settlement was, of course, weak at first, but it strengthened by degrees; and the French found means to ingratiate themselves with the original inhabitants.

It will be remembered that the neighbouring country, which we call the *United States*, was then in the possession of England, and the English began to feel some inconvenience from the growing power of their new neighbour, especially as the French had gained the confidence of the natives. Whenever England and France were at war, the new colony of Canada was sure to be involved in the dispute. In 1629 Quebec was taken by the English Admiral Keith, but was given up again at the next treaty of peace. In 1690, the inhabitants of New England (an English colony) endeavoured to subdue Canada, and bring it under the power of England, but without success. In 1711 another attempt was made, and great expense incurred in fitting out an armament, but again without success. At last, in 1759, another and a successful attempt was made to obtain the same point; the city of Quebec, and soon after the whole colony, were captured by the English, and annexed to the British crown, but the capture cost the lives of the two distinguished leaders of the armies—Montcalm, the French general, and Wolfe, the English.

General Wolfe, the hero on this occasion, was the son of a military officer, and was born in Kent in 1726. He showed in early youth some of the brightest qualities of the human mind, added to those which form a necessary part of the character of a successful general. At the early age of twenty he had not only entered the army, but had drawn forth the eulogium of some of the greatest officers, for his conduct in battle. When war ceased, he employed himself in improving, by every means, the corps under his command, and that corps was always distinguished for regularity and exactness of discipline.

Lord Chatham perceived his merit, and gave him a higher command, which he exercised on two or three occasions with great ability. At last, in 1759, he was placed in command of the expedition destined to take Quebec, to which we lately alluded.

This was an expedition of considerable difficulty and danger. He was to sail up the river St. Lawrence and capture Quebec, which lies on its shores. The place was, by its natural formation very strong, and succours of all kinds had been thrown into the town; and a garrison, consisting of French, Canadians, and Indians, were prepared at all points for the attack. The enemy were encamped along the shore. On the landing of Wolfe at the isle of Orleans, he found it absolutely necessary to seize and to fortify point Levi, and the western parts of the isle; as the Canadians might else prevent a ship from approaching Quebec. These points having been attained, he ordered works to be constructed there for the bombardment of the town. The French endeavoured to prevent the construction of these works, and crossed the river for that purpose, but in vain.

Wolfe, however, found that an attack on the city from the river side would be of small effect; he therefore resolved to carry on the attack on the land side. In order to effect this, he first attempted to land his troops some miles below the town near the falls of Montmorenci; but here he was repulsed by a large division of the French forces, with loss. Foiled in his first attempt to get on shore, Wolfe formed *the bold design of ascending to* the top of the banks above Quebec, commonly called the heights of Abraham. After previous preparation, the soldiers clambered up the heights with great difficulty, and the guns were hauled up by means of ropes and pulleys fixed round the trees, with which the banks are covered from top to bottom. At the top the plain commences, and extends close under the walls of the city.

By this arrangement he forced the French to come out of the city, and give him battle in the open plain. The result was a complete victory on the part of the English. But it was a victory purchased with the death of the brave leader. Just at that moment, when victory was almost within his grasp, he received a ball through his wrist; but instantly binding it up, he went on with the same alacrity as before, animating his troops by precept and example. But in a few minutes afterwards a second ball passing through his body, obliged him to be carried off to a small distance in the rear. There, roused from fainting, in the last agonies, by the sound of "They run," he eagerly asked, "Who run?" and being told "the French," and that they were defeated, he said, "then I thank God; I die contented," and almost instantly expired.

Our frontispiece, from Benjamin West's celebrated picture, represents the moment when news is brought to the dying general that victory had declared for the English. This picture attracted extraordinary notice, not only for the event which it celebrated, and the general excellence of the picture, but for West's correct taste in clothing his characters in costume similar to what the real personages wore; whereas hitherto Greek and Roman costume had been given in pictures which had not the slightest reference to Greece or Rome. We cannot do better on this subject than quote the words of Mr. Allan Cunningham.

The multitude acknowledged the excellence of the picture at once. The lovers of old art, the manufacturers of compositions called by courtesy *classical*, complained of the barbarism of boots, and buttons, and blunderbusses, and cried out for naked warriors with bows, bucklers, and battering-rams. Lord Grosvenor, disregarding the frowns of the amateurs, and the, at best, cold approbation of the academy, purchased this work, which, in spite of laced coats and cocked hats, is one of the best of our historical pictures. The Indian warrior, watching the dying hero, to see if he equalled in fortitude the children of the deserts, is a fine stroke of nature and poetry.

The king (George the Third) questioned West concerning the picture, and put him on his defence of this new heresy in art. To the curiosity of Galt we owe the sensible answer of West. "When it was understood," said the artist, "that I intended to paint the characters as they actually appeared on the scene, the archbishop of York called on Reynolds, and asked his opinion; they both came to my house to dissuade me from running so great a risk. Reynolds began a very ingenious and elegant dissertation on the state of the public taste in this country, and the danger which every innovation incurred of contempt and ridicule, and concluded by urging me earnestly to adopt the costume of antiquity, as more becoming the greatness of my subject than the modern garb of European warriors. I answered, that the event to be commemorated happened in the year 1758, in a region of the world unknown to Greeks and Romans, and in a period of time when no warriors wearing such costume existed. The subject I have to present is a great battle fought and won, and the same truth which gives law to the historian should rule the painter. If, instead of the facts of the action, I introduce fiction, how shall I be understood by posterity? The classic dress is certainly picturesque, but by using it I shall certainly lose in sentiment what I gain in external grace. I want to mark the place, the time, and the people, and to do this I must abide by truth. They went away then, and returned again when I had the painting finished. Reynolds seated himself before the picture, examined it with deep and minute attention for half an hour; then rising, said to Drummond, West has conquered—he has treated his subject as it ought to be treated—I retract my objection. I

foresee that this picture will not only become one of the most popular, but will occasion a revolution in art." "I wish," said the king, "that I had known all this before, for the objection has been the means of Lord Grosvenor's getting the picture, but you shall make a copy for me."

ON THE STUDY OF NATURAL PHILOSOPHY.

NOTHING can be more unfounded than the objection which has been taken *in limine* by persons, well meaning, perhaps, certainly narrow-minded, against the study of natural philosophy: that it fosters in its cultivators an undue and overweening self-conceit; leads them to doubt the immortality of the soul, and to scoff at revealed religion. Its natural effect, we may confidently assert, on every well-constituted mind, is, and must be, the direct contrary. No doubt, the testimony of natural reason, on whatever exercised, must of necessity stop short of those truths which it is the object of revelation to make known: but, while it places the existence and principal attributes of a Deity on such grounds as to render doubt absurd, and atheism ridiculous; it unquestionably opposes no natural or necessary obstacle to further progress: on the contrary, by cherishing, as a vital principle, an unbounded spirit of inquiry and ardency of expectation, it unfetters the mind from prejudices of every kind; and leaves it open and free to every impression of a higher nature, which it is susceptible of receiving: guarding only against enthusiasm and self-deception by a habit of strict investigation; but encouraging, rather than suppressing, everything that can offer a prospect or a hope beyond the present obscure and unsatisfactory state.

The character of the true philosopher is to hope all things not impossible, and to believe all things not unreasonable. He, who has seen obscurities which appeared impenetrable, in physical and mathematical science, suddenly dispelled; and the most barren and unpromising fields of inquiry converted, as if by inspiration, into rich and inexhaustible springs of knowledge and power, on a simple change of our point of view, or by merely bringing to bear on them some principle which it never occurred before to try,—will surely be the very last to acquiesce in any dispiriting prospects of either the present or future destinies of mankind: while on the other hand, the boundless views of intellectual and moral, as well as material, relations which open on him on all hands in the course of these pursuits,—the knowledge of the trivial place he occupies in the scale of creation,—and the sense continually pressed upon him of his own weakness and incapacity to suspend or modify the slightest movement of the vast machinery he sees in action around him,—must effectually convince him that humility of pretension, no less than confidence of hope, is what best becomes his character.—SIR JOHN HERSCHELL.

EVENING SOUNDS.

Sweet was the sound, when oft at evening's close
Up yonder hill the village-murmur rose.
There as I passed with careless steps and slow,
The mingling notes came softened from below:
The swain responsive as the milk-maid sung,
The sober herd that lowed to meet their young,
The noisy geese that gabbled o'er the pool,
The playful children just let loose from school,
The watch-dog's voice that bayed the whispering wind,
And the loud laugh that spoke the vacant mind;
These all in sweet confusion sought the shade,
And filled each pause the nightingale had made.

GOLDSMITH.

ON THE COLOUR OF STEAM.

THE reader is probably aware that when water contained in any vessel is heated, its temperature goes on gradually increasing until it attains the boiling point, when its form changes from that of a liquid to that of an air. This air is called "steam," and consists of water combined with a considerable quantity of heat, in the latent form, which the thermometer fails to detect, and whose existence can only be proved by certain methods which are familiar to the scientific. These methods, however, we need not here detail: it is sufficient to state generally, that steam and the water producing it indicate the same temperature to the thermometer; but that the former contains a far larger portion of heat to maintain it in an aëriform state than the latter does to retain its liquid state.

The temperature at which water boils is subject to considerable variation, depending chiefly upon three circumstances. 1st. The pressure of the atmosphere, as indicated by the barometer. 2nd. The purity of the water itself. 3rd. The nature of the vessel employed to contain the water. For example, the temperature at which water boils in a glass vessel is a little higher than in a metallic vessel; but for nearly all general purposes it is sufficiently correct to say, that water, exposed to the atmosphere, boils at 212° Fahrenheit.

When we see a kettle of boiling water standing on the fire, and steam issuing from the spout, we have an instance of water in an aëriform state. But this ought more properly to be called *vapour*, produced by the partial condensation of steam, by the cold air into which it is projected. Steam is invisible, as we shall find it to be if we watch the spout of the tea-kettle before the cold air has operated upon it.

But there are many instances in the arts and manufactures, of water being made considerably hotter than 212°; and other instances of boiling at a much lower temperature are frequent. If we heat water *in vacuo*, where the air cannot exert any pressure upon it, so as to prevent the formation of steam or vapour, we shall find that it will boil at so low a temperature as 90°. If, on the contrary, we heat water in a kettle which is both air and water tight, the water will arrive at a temperature far beyond 212° without boiling; and the tendency of the steam to escape will be so great, that the kettle, unless excessively strong, will burst with a tremendous explosion. This is what so often occurs with steam-boilers, (which are nothing more than large tea-kettles,) when they are not made sufficiently strong to resist the expansive force of the steam forming within; or when they become so weakened by corrosion and wear, as not to be able to withstand the same internal pressure.

Now the steam which is partially condensed by the air is generally of a colour which resembles that of the beautiful little clouds which we sometimes see floating in the air on a bright summer's day. But Professor Forbes has recently stated, that happening to stand near a locomotive engine on the Greenwich railway, which was discharging a vast quantity of high-pressure steam by its safety-valve, he chanced to look at the sun through the ascending column of vapour, and was surprised to see it of a very deep orange red colour, exactly similar to dense smoke, or to the colour imparted to the sun when viewed through a common smoked glass. Some time after, being on the Newcastle and Carlisle railway, he again watched for the repetition of such an appearance, and observed an important modification of it. "For some feet or yards from the safety valve at which the steam blows, its colour for transmitted light is the deep orange colour before described. At a greater distance, how-

ever, the steam being more fully condensed, the effect entirely ceases: even at moderate distances the steam-cloud is absolutely opaque to the direct solar rays, the shadow it throws being as black as that of a dense body; and when the thickness is very small, it is translucent, but *absolutely* colourless, just like thin clouds passing over the sun, which have indeed a perfect analogy of structure. When the steam is in this state, no indication of colour is perceptible in passing from the thickness corresponding to translucency, to that which is absolutely opaque."—*Philosophical Magazine*, No. 86.

The reader is probably aware that solar light, which illumines one-half of our earth by day, and which we usually call *white* light, is a compound of the three simple or primitive colours, red, yellow, and blue. If we allow the solar light to fall upon a triangularly shaped piece of glass, called a *prism*, such light is decomposed in passing through the prism, and we get an image consisting of seven colours, viz., red, orange, yellow, green, blue, indigo, and violet. The orange, green, indigo, and violet, are produced by certain admixtures of the other three colours, which are simple. The flames employed in artificial illumination, propagate white light with an excess of yellow, but in some instances there is an excess of red.

There are a large variety of bodies in nature which possess the property of absorbing certain colours, and reflecting the remainder: thus white light falls upon a green table-cover; the red rays are absorbed by the texture or dye of the cloth; the yellow and blue are reflected, and constitute that compound colour which the eye recognises as *green*. The manner in which certain rays are absorbed,—*why* they are absorbed,—and the phenomena of absorption generally, are not very well understood; but we are by its means enabled, if not to explain, at least to classify a large number of facts in Chromatics, (that department of optical science which relates to *colour*,) which would otherwise be inconveniently dispersed and unsystematized.

Now it seems to have escaped the observation of philosophers, previous to the time at which Professor Forbes writes, that steam, in certain states of condensation, is one of those bodies which are absorptive of colorific rays. This property of steam must, as the professor observes, have been witnessed by thousands of persons; but it has happened here, as is often the case, that not one of the spectators of this curious fact was aware of the valuable scientific information contained in it, until it was witnessed by one whose mind had been prepared by the study of nature to receive the fact, and appreciate its value. Professor Forbes proceeded to investigate the matter. He procured a high-pressure boiler, and tried the action of steam by night upon the artificial light of a lamp. The steam issued from a stop-cock in the top of the boiler, having a bore of a quarter of an inch. When the safety-valve was loaded with 50 lbs. on the inch, the steam issued nearly invisible; and near the jet it was perfectly colourless. As the light was raised, the orange colour appeared at the height of a few inches above the cock, and rapidly deepened up to a height of about twenty inches; after which it appeared that the rapid condensation of the steam only rendered it more opaque, without deepening its hue. On decomposing the light by means of a prism, and viewing the spectrum through the steam, the violet end was almost instantly absorbed, and then the whole of the blue which contributed to form the green. When the steam issued in greatest quantity, all the colours seemed changed except the red. Most of the orange, the yellow, and as much of the green as was not absorbed, had a dirty disagreeable hue.

We will not follow the professor further in his inquiry, which possesses, perhaps, more interest for the scientific than for the general reader. It will be satisfactory, however, to inform those who are anxious to know the use of an inquiry, before they become interested in its pursuit, that the facts as elicited by Professor Forbes, and the field of inquiry which they throw open, will tend to assist one most important branch of science, which indeed requires assistance, viz., *Meteorology*. It will probably enable us to understand better by the colours of clouds, the state of the vapours which compose them,—how far it is condensed,—and what changes of weather may be expected from nubeous phenomena. In a climate like ours, where clouds form so important a feature in the aspect of our skies, any inquiry tending to elucidate their formation and action ought to be received with attention by those who desire to become "weather-wise," with the assistance of science, instead of the dogmas of quackery.

SING ME A LAY.

SING me a lay,—not of knightly feats,
Of honour's laurels, or pleasure's sweets;
Not of the brightness in beauty's eye,
Not of the splendours of royalty;
But of sorrow, and suffering, and death, let it tell,—
Of the owlet's shriek, and the passing bell,
Of joys that have been, and have ceased to be:—
That is the lay—the lay for me.

Twine me a wreath,—but not of the vine,
Of primrose, or myrtle, or eglantine;
Let not the fragrant rose breathe there,
Or the slender lily her white bosom bare;
But twine it of poppies so dark and so red,
And cypress,—the garland that honours the dead;—
And ivy, and nightshade, and rosemary:—
That is the wreath—the wreath for me.

Bring me a robe,—not such as is worn
On the festal eve, or the bridal morn,
Yet such as the great and the mighty must wear;
Such as wraps round the limbs of the brave and the fair;
Such as Sorrow puts on, and she ceases to weep;
Such as Pain wraps round him, and sinks to sleep;
The winding-sheet, my garment shall be:—
That is the robe—the robe for me.

Oh! for rest,—not on Beauty's breast,
Not on the pillow by young Hope prest,
Not 'neath the canopy Pomp has spread,
Not in the tent where shrouds Valour his head.
Where grief gnaws not the heart, though the worm may feed there,
Where the sod weighs it down, but not sorrow or care;
The grave, the grave, the house of the free:—
That is the rest—the rest for me.—HENRY NEELE.

CAN there be that man who shall take even a rose into his hand, and not wonder as well as admire; not love as well as wonder; and not love the giver, as the gift? Beauty of form, beauty of colour,—variety, through nature and through art,—odours never wearying, gentle as sweet, and various as delicate,—profusion of produce,—a constitution through which it occupies all the year, and every climate on the globe:—such is the queen of flowers, the ever admired and beloved, of the untutored as of the civilized, in all ages and throughout all the world. Even on this little flower has the finger of God written, in language that cannot be mistaken: "In this too have I cared for you as for my children: even in this have I intended your happiness, as for that I have wrought in a thousand ways. Will you not acknowledge it? Will you not at least learn to enjoy my blessings, that you may make the first step to the gratitude which is my due?"—MACCULLOCH.

THE TOWN OF BETHLEHEM.

Jerusalem, the scene of our Lord's trial and ion, the pilgrim proceeds to visit Bethlehem, ce of his nativity. Proceeding through the ate, he turns to the left, and descending the bank into the ravine, he passes the pool of ah on the right: then ascending a rocky flat, inces in a south-west direction, over a rocky fruitful soil, where a few occasional patches fresh the eye with scanty crops of grain, grass, d flowers. The guide points out to him the tower of Simeon, the Greek monastery of nd the tomb of Rachel. The first view of em is described as imposing. The town he ridge of a hill, on the southern side of a id extensive valley, and extends from East to The most prominent object is the monastery, er the supposed "Cave of the Nativity:" its nd battlements give it the appearance of an re fortress. The Dead Sea is seen below, on , and appears to be near; "but not so found traveller," says Sandys, "for those high de- mountains are not to be directly descended." ad winds round the upper part of a valley, s said to be the scene of the vision of angels, nounced the glad tidings of the Saviour's the Shepherds; but the particular spot is by ns settled.

lehem, which was made a fortified town by am, 973, B.C., is about six miles from Jeru- It received its name which signifies *the house l*, from Abraham. It is also called in the Old ent Bethlehem Ephrata, and in the New Tes- Bethlehem of Judæa, to distinguish it from em of Zabulon. David was born in Bethle- Judæa, and here he passed his early years in ceful occupation of a shepherd; until his con- h the Philistine giant opened, under Divine nce, a more glorious career for him. Here re born many of the Scripture worthies; such h, Elimelech, Obed, Jesse, Boaz, and Mat- e Apostle; and here also is supposed to have e scene of the beautiful eclogue of Ruth.

Protestant traveller to Bethlehem is offended many illusions which are presented to him by superstition, which has converted this inter- historical town into a pious show-place. the troubles which attended the fall of the Roman empire Saint Jerome retired to this place, and passed the greater part of his life in the retirement of a peaceful grotto, where he wrote his commentaries on the Scripture, and pointed out many places in Bethlehem and its vicinity which, five centuries before, had been dignified by events connected with our Saviour's birth and life. The very attempt to identify such places must be attended with very questionable success; but St. Jerome has continued up to the present day to be the Roman Catholic authority in such cases. Thus, the stable in which our Lord was born is pointed out as a *grotto*, cut out in the rock; and on one side in a kind of recess, a little below the level of the rest of the floor, is a block of white marble, hollowed in the form of a manger, which is said to indicate the spot where the infant Jesus was laid upon straw. Now it appears from the gospel narrative that the virgin did not take refuge in a cave or grotto, but in a manger belonging to the inn or *khan*; the rooms of the latter being full of guests, the holy family took up their abode in the *court* allotted to the beasts of burden.

Over this grotto, the supposed scene of the nativity, a church has been built in the form of a cross. The nave is adorned with four rows of Corinthian columns, each column is eighteen feet high, and two feet six inches in diameter. As the roof of the nave is wanting, the columns support only a frieze of wood, which supplies the place of the architrave and the whole entablature. Open timber-work rests on the walls, and rises into the form of a dome, to support a roof, which no longer exists, or which was perhaps never finished. The remains of some paintings on wood and in mosaic, are also seen. The nave, which is occupied by Armenians, is separated from the three other branches of the cross, by a wall, which thus destroys the unity of the building. The upper part of the cross is occupied by the Greeks as a choir. Here is shown an altar dedicated to the "Wise men of the East;" at the foot of which is a star, cut in marble, corresponding, as the monks say, to the point of the heavens where the miraculous meteor stood still, and directly over the spot where the Saviour was born in the subterraneous church below. Fifteen steps and a narrow passage conduct to the sacred crypt of the nativity, which is thirty-seven feet and a half long, eleven feet broad, and nine feet high. It is

lined and floored with fine marble, and furnished on each side with five oratories, or chapels for prayer, "answering precisely," as Chateaubriand says, "to the ten cribs or stalls for horses contained in the stable in which our Saviour was born." On the eastern side is the supposed spot already alluded to, where the Saviour was born. This spot is marked by a glory on the pavement, composed of marble and jasper, and encircled with silver bearing the inscription,

HIC DE VIRGINE MARIA
JESUS CHRISTUS NATUS EST.

Over this is a marble table or altar resting against the side of the rock, here cut into an arcade. The *manger* is seven paces distant from the altar. The chapel does not receive any light from without: it is illuminated by thirty-two lamps presented by different Christian princes.

Chateaubriand*, in his usual florid style, says,—

Nothing can be more pleasing, or better calculated to excite devotion, than this subterranean church. It is adorned with pictures of the Italian and Spanish schools representing the mysteries of the place: the Virgin and Children after Raphael, the Annunciation, the Adoration of the Magi, the Approach of the Shepherds, and all those miracles wherein sublimity and innocence are combined. The usual ornaments of the manger are of blue satin embroidered with silver. Incense is continually burning before the cradle of the Saviour. I have heard an organ, touched by a skilful hand, play during mass the sweetest and most tender airs of the best Italian composers. These concerts charm the Christian Arab, who, leaving his camels to graze, comes, like the old shepherds of Bethlehem, to adore the King of kings in his manger. I have seen this inhabitant of the desert communicate at the altar of the Magi with a fervour, a piety, a devotion unknown to the Christians of the west. "No spot in the universe," says Father Néret, "inspires more devotion. The constant arrival of the caravans from all Christian nations—the public prayers—the prostrations—even the richness of the presents sent here by the Christian princes,—all this produces sensations in the soul which are far more easy to feel than to describe." "Let us add," continues Chateaubriand, "that these scenes are made still more striking by an extraordinary contrast; for, on quitting the grotto you leave behind you splendour, riches, arts, and the religion of a civilized people; and you are transported into a profound solitude in the midst of the deserts of Arabia, among half-clad savages and Mussulmans without faith. And yet this was the scene of so many wondrous miracles; this the sacred ground whereon joy may no longer appear:—the remembrances of its glory are enclosed within its bosom."

We have dwelt thus long on the subject of the chapel at Bethlehem, from a feeling that any authentic information respecting our Saviour's birth-place must be received with interest; but happily our purer form of faith rejects the ornaments and the display which merely mark the supposed site of an event, which constitutes the hope of that blessed immortality promised to those who believe in and rest upon "the record that God gave of his Son."

The village of Bethlehem contains about three hundred inhabitants, most of whom gain their living by the manufacture of beads, crucifixes, &c., which are eagerly purchased by the pilgrims. The monks of this place also enjoy the privilege (heathenish though it be) of marking the limbs of devotees with crosses and other Romish devices, by means of gunpowder.

In Bethlehem is also shown a deep and large cistern, in which the bodies of the infants murdered by the command of Herod are said to have been thrown.

On the north-eastern side of the town is a deep valley, where tradition says the angels appeared to the shepherds. Here also is a fountain, said to be that for whose water David so earnestly longed, when oppressed by the heat of day and his conflict with the Philistines. By referring to 2 Samuel xxiii. 15, 18, the reader will find an account of this interesting event. Dr. Clarke stopped and drank of the delicious water of this fountain, and thinks, from its correspondence with the descriptions of the sacred historian and of Josephus, as well as from the permanent character of natural fountains, that there can be no doubt of its identity.

About two miles from the town is the tomb of Rachel, who was buried here by Jacob during his pilgrimage, as we read in Genesis xxxv. 19, 20. Her tomb is now covered by a small square Mohammedan building, surmounted by a dome, resembling the tombs of saints and sheiks in Arabia and Egypt.

Bethlehem is now called Beit-Lahm or Beit-el-Ham. It stands on a chalky soil, and the air is salubrious. Authors are not agreed as to the fruitfulness of the soil. Chateaubriand says significantly, "I nowhere remarked that fecundity which has been attributed to the valley of Bethlehem: it is, however, true that under a Turkish governor the most fertile soil degenerates in a few years into a desert." Dr. Wittman says that

The sides of the mountain on which the town is situated, were, as well as the summit, interspersed with fine vineyards, banked in with stones, which must have cost a prodigious labour to the cultivators. The grapes they yielded were remarkably large and finely flavoured. In addition to these we saw figs, pomegranates, and an abundance of olives, on which fruits the inhabitants in a great measure subsist. In the valleys some corn is produced; and the bread made from it is of an excellent quality. The dews, which fall in great abundance, are highly favourable to the vegetation in general.

* *Itinéraire de Paris à Jérusalem, &c.*; Troisième Partie.

ACCIDENTS IN ANCIENT CHURCHES.

WHILE Mr. Telford resided in Shrewsbury Castle, under the patronage of Sir William Pulteney, an accident happened in the town, which ought to find a place in his biography. The collegiate and parochial church of St. Chad was founded by the kings of Mercia, in the seventh century, upon the final conquest of Shrewsbury by the Saxons, and the edifice was burnt in the reign of Richard the Second, by the carelessness of a plumber, who did not (as is too usual) escape with impunity. He was terrified at seeing the church in flames, and in his flight, attempting to ford the Severn, was drowned.

The church was rebuilt, and after four centuries, in the year 1778, one of the four pillars which supported the tower in the middle of the church was observed to crack in various places. These alarming appearances in the mother church of the town created general anxiety, and Sir William Pulteney sent Mr. Telford to inspect the state of the fabric. His report to the assembled Parish Vestry was, That in consequence of graves having been dug in the loose soil, close to the shallow foundation of the N.W. pillar of the tower, it had sunk, so as to endanger the whole structure, and that the ruin of the church must speedily ensue, unless it were immediately secured by a thorough repair; and he recommended that the bells should be removed and the tower taken down forthwith, so as to permit the shattered pillar to be restored and secured, when relieved from the vast superincumbent weight. But the Parish Vestry, which met in the church on this occasion, exclaimed against such an expensive proposal, and some of them imputed interested motives to Sir William Pulteney's Scottish architect; upon which Mr. Telford left them, saying, "That if they wished to discuss anything

besides the alarming state of the church, they had better adjourn to some other place, where there was no danger of its falling on their heads."

The Vestry then proceeded to direct a mason to cut away the injured part of the pillar, in order to underbuild it; and, on the second evening after commencing this infatuated attempt, the sexton was alarmed at the fall of lime-dust and mortar, when he attempted to raise the great bell for a knell on the decease of a parishioner. He left the church immediately, and the next morning (9 July, 1788), while the workmen were waiting at his door for the church-key, the clock struck four; and the vibration, produced by the motion of the chime-barrel, brought down the tower, which overwhelmed the nave of the church, demolishing all the pillars on the north side of it, and shattering the rest. It was now perceived that the walls and pillars of the church, as is seen in many such ancient structures, consisted of a mere outside coating of freestone, the interior being filled with a mass of rubbish which crumbled into dust. Among this, and in the very heart of the pillars, were found stones rudely carved, which were evidently of Saxon sculpture, and had been ruins of the ancient church, thus applied in building the second church in the reign of Richard II. The present church was entirely rebuilt in the interval from 1788 to 1798, but in a manner which does no credit to the taste of the architect.

The catalogue is lamentable of ancient churches which have fallen from want of attention, and especially from grave-digging near the walls and pillars. The middle tower of the abbey church of Selby fell in the year 1690, and destroyed half the church. So at Whitchurch (Salop), at Banbury in Oxfordshire, Chelmsford in Essex, and at Great Shelford in Cambridgeshire. The city of Hereford was deprived of its principal ornament by the fall of the west tower and magnificent west portal of the cathedral, which suddenly became a heap of ruins, in the year 1781; and the workmanship was too expensive for modern imitation, although the west end of the cathedral has been decently restored by a good architect.—*Life of Thomas Telford.*

A SKETCH OF MOSCOW,

In a Letter from Bishop Heber to his Mother.

My dear Mother, Moscow, Jan. 4, 1806.

Our journey has been prosperous, and, after about ninety hours' continued jolting, we arrived safely at Moscow about eight o'clock last night. Mr. Bayley came with us, and we found his knowledge of the Russian language and manners of great service to us on the road. Our method of travelling deserves describing, both as being comfortable in itself, and as being entirely different from anything in England. We performed the journey in Kibitkas, the carriages usually employed by the Russians in their winter journies; they are nothing more than a very large cradle, well covered with leather, and placed on a sledge, with a leathern curtain in front; the luggage is packed at the bottom, the portmanteaus serving for an occasional seat, and the whole covered with a mattrass, on which one or more persons can lie at full length, or sit, supported by pillows. In this attitude, and well wrapped up in furs, one can scarcely conceive a more luxurious mode of getting over a country, when the roads are good, and the weather not intense; but in twenty-four, or twenty-five degrees of frost, Reaumer, no wrapping can keep you quite warm; and in bad roads, of which we have had some little experience, the jolting is only equalled by the motion of a ship in a storm.

In the weather we were very fortunate, having a fine clear frost, about as mild as an English Christmas. Our first forty hours were spent in traversing an unfertile and unlovely country, the most flat and uninteresting I ever saw, with nothing but occasional patches of cultivation, and formal fir woods, without a single feature of art or nature which could attract attention. Once indeed, from a little elevation, we saw the sun set to great advantage; it was singular to see it slowly sinking beneath the perfectly level horizon of the sea of land which surrounded us. The night which followed was distinguished by more jolting than usual; and about sunrise, Thornton drew the curtain, and cried out,—"England!" I started up, and found we were on the summit of a low range of stony hills, with an enclosed and populous country before us, and a large town, Valdai, which, with its neighbourhood, had some little resemblance to Oxford, as seen from the Banbury road. This is, in fact, the boundary of Ancient Russia; all beyond were the territories of Novogorod, Istria, and the other countries they have conquered. The whole plain from Valdai to Moscow is very level, entirely arable, generally common fields, with some shabby enclosures, thickly set with villages and small coppices, in which the firs begin to be relieved by birch, lime, ash, and elm. Tver and Torshok are large towns, but have nothing in them to detain a traveller. During this journey I was struck by observing the very little depth of snow on the ground, which was not more, nor so much, as we often see in England, and no where prevented my distinguishing the meadows from the stubble-fields. Mr. Bayley said he had often made the same observation, and that it was not peculiar to the present year.

We had our guns with us; and often left the Kibitka in pursuit of the large black grouse, of which we saw several,—a noble bird, as large as a turkey. They were, however, so wild, we could not get a fair shot. We had some hopes of killing a wolf, as one or two passed the road during the first part of our journey; but it was during the night: and before we were fairly roused, and could get our guns ready, they were safe in the wood. In severe winters they are sometimes easily shot, as they keep close to the road-side, and, when very much famished, will even attack the horses in a carriage: they are not considered dangerous to men, except in self-defence.

Of the people, we, of course, saw but little; though, having so good an interpreter with us, we asked many questions, and went into several of the cottages, which we found much cleaner than we expected, but so hot that we could not endure to remain in them long. A Russian cottage is always built of logs, cemented with clay and moss, and is generally larger than an English one; it has two stories, one of which is half sunk, and serves as a store-house; two thirds of the upper story are taken up with the principal room, where they sit and sleep; and the remainder is divided between a closet, where they cook their victuals, and an immense stove, not unlike an oven, which heats the whole building, and the top of which (for the chimney is only a small flue on the side) serves as a favourite sitting and sleeping-place, though we could scarcely bear to lay our hands on it. In the corner of the great room always stands the bed of the master and mistress of the family, generally very neat, and with curtains, sometimes of English cotton: the other branches of the family sleep on the stove or the floor. In the post-houses, which differ in no

respect from this description, we always found good coffee, tea, and cream,—nothing else can be expected, and we carried our other provisions with us.

The country people are all alike, dirty, good-humoured fellows, in sheep-skin gowns, with the wool inwards. The drivers crossed themselves devoutly before beginning each stage, and sung the whole way, or else talked to their horses. A Russian seldom beats his horse, but argues with him first, and at last goes no further than to abuse him, and call him wolf or Jew, which last is the lowest pitch of their contemptuous expressions. Their horses are much larger and better fed than the Swedish, and, when talked to, *secundum artem*, trot very fast. Nothing on our journey surprised us so much as the crowds of single-horse sledges, carrying provisions to Petersburg; it would not be exaggerating to say that we passed, in twenty-four hours, about a thousand. Every article of necessary consumption must, indeed, be brought from a distance, as the neighbourhood of Petersburg produces nothing to "make trade," very little to "make eat." When I have seen the fine fertile country, abounding in everything good and desirable, which Peter deserted for the bogs and inclement latitude of the Neva, I wonder more and more at the boldness and success of his project. It is as if the King of England should move his capital from London to Bamff, and make a Windsor of Johnny Groat's house.

We reached this vast overgrown village, for I can compare it to nothing else, in the moonlight, and consequently saw it to great advantage; though, as we passed along its broad irregular streets, we could not but observe the strange mixture of cottages, gardens, stables, barracks, churches, and palaces. This morning we have been much delighted with a more accurate survey. Moscow is situated in a fine plain, with the river Moskva winding through it, the town is a vast oval, covering about as much ground as London and Westminster. The original city is much smaller; it forms one quarter of the town, under the name of Katai-gorod, the city of Kathay; it has preserved the name from the time of the conquest of Russia by the Tartars, when they seized on the city, and made the Russians quit their houses, and build without its walls, what is now called Biel-gorod, or White Town. Kitai-gorod is still surrounded by its old Tartar wall, with high brick-towers, of a most singular construction; the gates are ornamented in the old oriental style, and several of the older churches have been originally mosques. But it is in the Kremlin, or palace quarter, that the principal vestiges of the Khans are displayed; their palace still exists entire, and is a most curious and interesting piece of antiquity. As I walked up its high staircase, and looked round on its terraces and towers, and the crescents which yet remain in their gilded spires, I could have fancied myself the hero of an eastern tale; and expected, with some impatience, to see the talking-bird, the singing-water, or the black slave with his golden club. In this building, which is now called the treasury, are preserved the crowns of Kasan, Astracan, and Siberia, and of some other petty Asiatic kingdoms. The first entrance to the Kremlin, after passing the great Saracenic gate, is excessively striking, and the view of the town and river would form a noble panorama.

I was, indeed, so well satisfied with what I saw from the court-yard, which is very elevated, that I was not a little unwilling to do what is expected from all strangers,—to clamber up the tower of St. Michael, to see a fine prospect turned into a map. The tower stands in the middle of the court: half-way up is the gallery, whence the ancient monarchs of Russia, down to the time of Peter the Great, used to harangue the assemblies of the people. Before it is a deep pit, containing the remains of the famous bell cast by the Empress Anne, and about three times the size of the great bell at Christ Church. It was originally suspended on a frame of wood, which was accidentally burnt down, and the weight of the bell forced it, like the helmet of Otranto, through the pavement, into a cellar.

On each side of the Michael tower is a Christianized mosque, of most strange and barbarous architecture; in one of which the sovereigns of Russia are crowned, and in the other they are buried. The rest of the Kremlin is taken up by public offices, barracks, the archiepiscopal palace, and two or three convents. An immense ditch, with a Tartar wall, surrounds it; and it is approached by two gates, the principal of which a Russian never passes with his hat on. * * * The houses, with the exception of some vast palaces of the nobility, are meanness itself. The shops are truly Asiatic, dark, small and huddled together in long vaulted bazaars, and the streets ill-paved and lighted.

January 10th. Of the society, we have seen too little to form any judgment. We have called on the governor, and some other persons to whom we had letters of introduction, and have been civilly received. We have also been at two private concerts, at one of which we met Madame Mara, who is now here with Signor Florio, and who sung but very carelessly. Concerts are fashionable at Moscow; and cards, as may be expected in a society, which, though they will not allow it, is certainly at present provincial, are much more common than at Petersburg. The society consists, in a great measure, we are told, of families of the old nobility, and superannuated courtiers, who live in prodigious state, and, from what we have seen, great and almost cumbersome hospitality. Some of their daughters seem tolerably accomplished, and very good-natured, unaffected girls. We have seen nothing remarkably beautiful, though the bloom and fresh complexions of Moscow are often envied by the Petersburg belles.

We promise ourselves a great deal of amusement and instruction, from the number of old officers and ministers who have figured in the revolution, and the busy scenes of Catherine's time. This being Christmas day, according to the Russian calendar, we are going to the grand gala dinner of the governor's: it is necessary for us to go in full uniform, which, indeed we must frequently do; as "the old courtiers of the queen, and the queen's old courtiers," are much more attentive to such distinctions than the circle we have left in Petersburg. The English nation is said to be in high favour here, and we were much gratified by the cordial manner in which many persons expressed themselves towards us. We have been rather fortunate in seeing a splendid Greek funeral, attended by a tribe of priests, deacons, and archimandrites, under the command of one archbishop and two subalterns. The archbishop was a Circassian, and one of the bishops a Georgian. The "Divine Plato" is not now in Moscow. I am eagerly expecting news from you, which, with some regard to the news from Germany, must decide our future tour.

Believe me, dear Mother, yours affectionately,

REGINALD HEBER.

[WILLMOTT'S *Letters of Eminent Persons.*]

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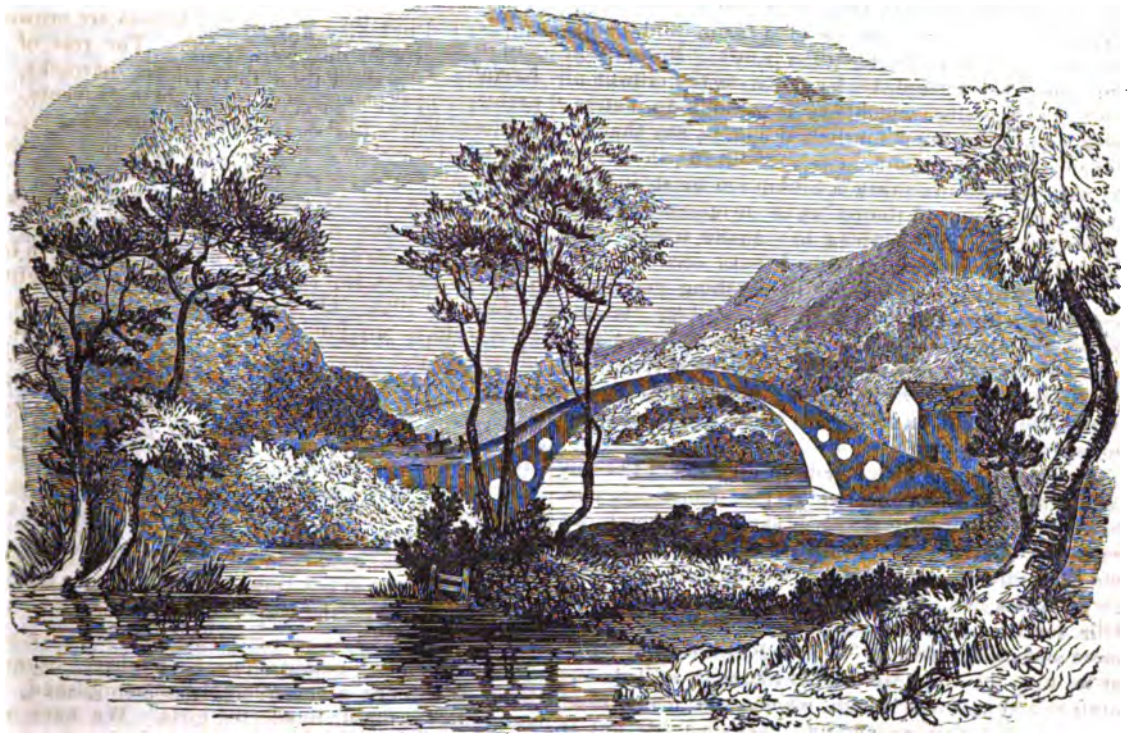
PONT Y PRYDD, GLAMORGANSHIRE.



PONT Y PRYDD, OVER THE TAFF.

PONT Y PRYDD, or "the beautiful bridge," is a structure which deserves to be well-known, not only on account of its architectural merits, but also for the history of the extraordinary genius who is inseparably connected with it; and the knowledge of whose name and fortunes is calculated to exist at least as long as the structure we are about to describe,—a singular monument of patience, fortitude, and skill.

WILLIAM EDWARDS was born in the parish of Eglwysilan, in Glamorganshire, in the year 1719. He was the youngest son of a farmer, who died when William was only two years old; but his mother continued to occupy the farm, assisted by two sons and a daughter, all older than William, who also worked on it until he was eighteen years of age. The only education he ever received was being taught to write and read in his native Welsh; but being one of Nature's scholars, with a mind constantly on the alert and greedy for instruction, he taught himself the principles of masonry by wandering among the ruins of an old gothic castle in his native parish. At the age of fifteen he became director-general of the stone-fences of his mother's farm: a species of fence peculiar to the mountain-districts of Wales. The fences in this part of the country are called *dry walls*, from the circumstance of their being constructed without the use of mortar. It soon came to be noticed that the fences of the Edwards's were uncommonly neat and firm, and the time occupied in their erection extremely short. Some friends of the family, therefore, advised the eldest brother to encourage William in masonry-work, not only on the family farm, but also on the farms of the neighbours who were willing to employ him. This was assented to; and William soon got into general requisition, and added his earnings to the common stock of the family.

Hitherto he had never seen masons at work, and was therefore ignorant of the processes and tools of masonry. But it happened that some masons were called into the village to erect a shed on the premises of a smith-farrier. William watched the operations of these workmen with the liveliest interest; and he was accustomed to stand by them for hours together, while they were at work, noting every action and process of the work. Admiring the neatness with which the pillars and other parts of the shed were constructed, and seeing the means used, he felt ambitious to equal them. He remarked that with the common mason's hammer of the country, one end of which is an axe, they were enabled to dress their stones neatly; and he concluded that the reason why he could not do the same, was, that his hammer was not *steeled*. He therefore procured hammers of a better construction, and found that he could execute his dry-walling in a far superior manner compared with his previous performances. He also procured other masons' tools, the constant use of which gave him great dexterity, and he yearned to rise in the profession of his choice, and from a builder of dry-walls, he hoped to become a builder of houses.

Soon after this period, Edwards was delighted at the confidence reposed in him by a neighbour, who engaged him to build a little workshop. This first attempt at house-building was very successful; and

Edwards obtained great credit for his performance. His next *great* work (*great* in his own estimation,) was the erection of a mill in his own parish; when he first became acquainted with the nature and wonderful properties of the *arch*. This mill, being completed, was so much approved of, not only by his employers, but also by judges of masonry, that Edwards came to be considered as the best workman in that part of the country, and he was applied to very generally where masonry-works were wanted: his fidelity and skill being well known and appreciated.

In his twenty-seventh year Edwards was induced to engage in an undertaking of a far more difficult and complicated character than any of the works which had yet occupied him. This was the bridge over the Taff, a river which flowed through his native parish, and, following a southward course, discharged itself into the Severn.

It was proposed to throw a bridge across this river at a particular spot in the parish of Eglwysilan, so as to unite the two ends of an intended road. But this proposal had many natural difficulties to contend with, on account of the great breadth of the stream, and the frequent swellings to which it was liable. Well-wooded mountains rose to a great height from both banks of the stream, which attracted the rain and poured its torrents into the river. But these difficulties probably acted as incentives to Edwards, and he contracted for the proposed bridge,—the first work of the kind in which he had ever been engaged. In the year 1746 he began his work, and constructed a bridge of three arches, elegantly light in their construction; and the whole edifice was executed in a style decidedly superior to anything of the kind ever seen in Wales; and it was in consequence universally admired and wondered at, as the production of a self-taught and untravelled artist. But Edwards was only just beginning his apprenticeship to the art of bridge-building; an apprenticeship which was cruel and severe on our poor hero, and under which an ordinary mind would have sunk spiritless and discouraged. Edwards had given ample security that the bridge should last seven years. Two years and a half only of the term had expired, when a flood of extraordinary magnitude occurred in the river. The mountain-torrents not only swelled the river, but some of the largest trees were torn up by the roots, and carried down the stream to the bridge, whose arches were not sufficiently large to admit of their passage through. Brush-wood, weeds, hay, straw, and whatever lay in the way of the flood, came down and collected about the branches of the trees, which stuck fast in the arches, and choked the free current of the waters. The aggregate of so many collected streams, uniting in their progress here, rose up against this accidental embankment, and the pressure of the water carried the bridge entirely away before it.

Edwards now proceeded by the terms of his contract to erect a second bridge with the least possible delay; and in order to admit freely under it whatever incumbrances the flood might bring down, he determined to have only one arch. None but a bold and original mind could have cherished so magnificent an idea. An arch with a span of 140 feet from pier to pier, was a thing unheard of in his time. The largest arch in the world was that of the Rialto at Venice, whose span was only ninety-eight feet*: but Edwards was one of the gifted few who required not the sanction of mere precedent; but confiding in the resources of his own mental strength, he set an example to the world which was subsequently admired and willingly copied.

Edwards finished the erection of this stupendous arch in 1751, and had only to add the parapets when he was doomed once more to misfortune. The bridge fell into the water over which it was to have furnished a path; the great weight of the masonry at the haunches forced out the key-stone; and the arch, thus deprived of its support, of course fell.

This was a severe blow to a man who as yet had met with nothing but misfortune in a work which was to make or mar his fortunes as an architect. But his courage did not give way so easily as his bridge: his spirit and confidence were undaunted, and he proceeded, for the third time, to re-construct his bridge. Adhering to his plan of the single arch, he obviated this objection in the second bridge, by leaving three cylindrical holes, of nine, six, and three feet in diameter, in each of the haunches; and thus so reduced their weight, that they were no longer dangerous to the general safety of the structure. These holes or cylinders rise above each other, ascending in the order of the arch: their position, and the general structure of the bridge, may be understood by inspecting the figure at the head of the present article: these holes give the bridge a light and elegant appearance. About half a mile above the bridge is a waterfall, which is celebrated on account of the magnificent scenery which surrounds it. The road is along a path beautifully overhung, between the bank of the river and a lofty pile of impending rock, that seems, at a distance, to be connected with its rival on the other side, by the magnificent arch of the new bridge.

From the rocks in the middle of the river, the reach of the vale is peculiarly advantageous: and perhaps, the magic of the New Bridge is nowhere so imposing as when viewed from the front of the fall. The abutments on each side are concealed by a small bend of the Taff, and by the intervening foliage of the banks: and the arch seems to ride unsupported in the air.

This third bridge was completed in 1755, and has stood ever since.

The fame of Edwards now extended far and wide. Numbers of persons came from all parts of the world to see this bridge and its builder, who was considered as the wonder of his time. He was soon employed to build other bridges in South-Wales. He constructed the Usk bridge, over the river so named, at the town of Usk, in Monmouthshire: also a bridge of three arches over the river Tawy; and Pont ar Towy over the same river, of one arch, with a span of eighty feet, with one cylindrical hole over each haunch: Bettws' bridge in Caermarthenshire, consisting of one arch, forty-five feet in span: Landovery bridge, in the same county: Whychbree bridge, also over the Towy, with a single arch, ninety-five feet in span, and two cylinders in each of the haunches. Abergavan bridge in Glamorganshire, was also of his construction: also Glasbury bridge, over the Wye, in Brecknockshire, a light and elegant structure of five arches. In all these bridges, the arches were small segments of large circles, so that the roads over them were much flatter and better adapted for the purposes of traffic than in the first attempt of Edwards at bridge-building.

Edwards could read and write in his native Welsh from early youth. A friendly neighbour taught him the rudiments of arithmetic, and in his twenty-first year he learnt to read in English from an old blind schoolmaster, in whose house he lived for a short time, while doing some work in the country-town of Cardiff. Although his literary attainments were humble, yet his industry, his spirit of inquiry, and

* We are here alluding to Bridges with an arch of a single span. The celebrated Alcantara aqueduct bridge, near Lisbon, finished in 1732, consists of thirty-five arches, the eighth of which has a span of *108 feet, and a height of 227 feet.*

moreover his natural genius, made him a superior man. He continued to be actively employed as architect and farmer, until he died. His activity of mind was such, that he also employed his Sundays in officiating as minister to an independent congregation. He had been regularly ordained to that office at the age of thirty, and he held it till his death. He accepted a salary from his congregation, because he thought it right that they should support their own minister; but the money so gained he never applied to his own wants, but distributed it, and much more, in alms to the poor.

This worthy and superior man died at the age of seventy, in 1789; leaving behind him a family of six children, the eldest of whom, David by name, had become an architect and bridge-builder, solely under the instructions of his father; and he continued to exercise these professions with credit and skill. David's eldest son is said also to be following in the path of his father and grandfather.

The reader interested in the subject of bridges generally, will find two supplements thereon, one in Vol. VII., p 219; and the other in Vol. VIII., p 121, of this work.

Midsummer, or the Summer solstice, presents itself to the contemplative man as that point of time which, like the prime of life, may be called the pivot of our expectations; on which anxieties change their balance. With what desires, hopes, and anticipations, each vernal ray inspires the zealous botanist, just as buoyant spirits excite the youthful mind.

Pleasurable prospects still continue to arise till that fated day,—the longest of the year, to which we have just alluded, like the strongest of man's life,—when no longer does each succeeding day outstretch its predecessor in length or strength, but a shadowy reverse commences. When the season of brilliancy has risen to its zenith, or man to the perfection of his nature, then, and not till then, arrives a full reflection on declining days. If, however, the cultivator of a flower garden, or of the years of human life, has indulged due thought of a future season; if his young plants be well trained, his whole garden in good culture, and he has made preparation to meet the icy hand of a Winter fast approaching, all is well: he fears not present nor future storms, all seasons alike afford him pleasure. To him, indeed, we may say with Southey:—

Sweet are the harmonies of Spring,
Sweet is the Summer's evening gale,
And sweet the autumnal winds that shake
The many-coloured grove.

Reflection too may love the hour
When Nature, hid in Winter's grave,
No more expands the bursting bud
Or bids the floweret bloom.

For Nature soon in Spring's best charms,
Shall rise revived from Winter's grave,
Expand the bursting bud again
And bid the floweret bloom.——Maund.

Sense and understanding are not the only requisites to make men judge rightly of even the clearest religious truths. Our passions and affections have a very powerful influence over us; and where they are not carefully managed and governed, it is amazing to see, how the slightest occasions will pass for most weighty and conclusive arguments; and how the brightest truths will be thought to be of little moment, even to persons of the greatest sense and sagacity in other matters, where their interest or their humours do not contradict the truths which are offered to them. It is no hard matter to judge of truth, if we are sincerely disposed to embrace it. A common capacity, and an ordinary share of understanding, will afford light enough, if evil passions do not make the light that is in us to become darkness; but if our heart is not duly disposed to embrace the truth, neither may we be persuaded by the greatest arguments and demonstrations that can be offered for it, even though we have uncommon abilities to judge of, and understand the force of what is represented to us.—Sherlock.

ON THE ATTRACTIVE FORCE OF A BLAST OF AIR.

When compressed air escapes through an orifice, a very singular phenomenon may be shown, which has not yet found its way into our books of science, although it is well known on the continent. This phenomenon can be exhibited by the following simple experiment:—

If we cut a couple of cards each into a disc of about two inches in diameter, and perforate one of these at the centre, and fix it on the top of a tube, such as the barrel of a common quill; then, if we give the other card a little concave bend, and place it over the first, the orifice of the tube being thus directly under and almost in contact with the upper card; now, if we try to blow off the upper card, we shall find it impossible to be done.

This remarkable fact seems to have been noticed by several persons independently of each other. The French bring forward no less than three claimants, namely, M. Griffith, Mining Engineer of Fourchambault, and Messrs. Boigues of the same place, who showed the fact to Messrs. Thenard and Clement in September 1826. About this time also the same fact appears to have been noticed by Mr. Roberts, an intelligent manufacturer of Manchester. We here give the several accounts of the discovery.

M. Griffith says that, if air be powerfully compressed in a reservoir furnished with a circular opening in one of its vertical sides, and we present to the blast of air issuing therefrom a flat piece of board or metal, it will at first be repelled by the violence of the blast; but after forcing it nearer to the aperture, so as to overcome this repulsion, it will be powerfully attracted. In this position the air escapes by diverging between the interior surface of the board or metal, and the rim of the orifice.

The account of Messrs. Boigues is as follows:—A circular opening, one or two inches in diameter, being made in the flat side of a reservoir of compressed air, employed to feed a blast furnace, the air escapes with great violence; but, if we bring near to this opening a disc of wood or metal seven or eight inches in diameter, and having overcome the resistance caused at first by the blast upon the plane surface of the disc, the latter will no longer be repelled; it oscillates rapidly, at the same time receding from and approaching to the opening within very narrow limits. The air continues to escape with great noise between the surface of the disc; and that of the side of the vessel containing the air. If now we wish to withdraw the disc, it will require great muscular exertion to do so; and although the disc be not in actual contact with the side of the air-vessel, it seems as if glued to it.

The next discoverer of this phenomenon is our countryman, Mr. Roberts. Several years ago he had constructed an apparatus for ventilating his manufactory. A pipe, conveying a blast of air, terminated close to the wall of the principal apartment; and with a view to regulate the quantity of air to be introduced, he placed a valve over the terminus of the blast-pipe; but found, to his surprise, that the most powerful blast of air not only would not lift the valve, (which was merely a piece of flat board,) but that it even held the valve firmly down over the mouth of the pipe, so that the strength of one man was insufficient to withdraw it. This experiment has often been shown to visiters as one of the curiosities of Manchester.

This phenomenon can be produced by a blast of any kind of gas or vapour; by steam, and even by water, and other liquids.

The attractive force of a blast of air is particularly remarkable, if we place the card, mentioned at the beginning of this article, with its concave side upwards upon the table, and, with the tube in the mouth, hold the other card over it, and blow through the tube, when the concave card will start up from the table, and adhere to the other.

It has been stated, in reference to the experiment with the cards, that the upper card cannot be blown off, because the current of air, which passes between the two cards in consequence of blowing through the tube, is in a more rarefied state than the atmosphere around and above; and that therefore the latter presses upon the two cards, so long as the blast is kept up and causes them to adhere.

But to show that the upper card is not retained in its place merely by atmospheric pressure, the following experiment was performed by Mr. Tomlinson. Let a brass tube, open at both ends, and terminated at the lower end by a perforated screw, be fixed to the table of the air-pump. A disc of card, two inches in diameter, is placed horizontally at the upper end of the tube. Another card of the same size, made slightly concave, is placed over the first. Let the whole be covered with a glass receiver: then let the air be removed, which of course can only quit the receiver, by passing out through the brass tube. When the exhaustion is carried to its utmost limit, let the air be re-admitted in a full gush through the brass tube, and the upper card will *not* be blown off.

This experiment has been tried over many times, with various states of exhaustion, from a quarter of an inch of mercury to twenty inches; but in no case was the card blown off, or even agitated in the slightest degree: therefore the upper card is not retained in its position by the pressure of the atmosphere; but it is retained in its place from this circumstance, that when a fluid issues from an open tube, the lateral or side pressure of such fluid amounts to nothing. This is an extraordinary fact, and we will endeavour to make the proof of it as simple as possible.

It is a well-known property of fluids that they transmit their pressure equally in all directions; but this law applies only to fluids in a state of rest. When they are in motion they are subject to the laws which regulate the motions of solids, and do not transmit any lateral pressure, except when they meet obstacles to their onward motion. In proof of this conclusion we refer to an elegant experiment of Bossuet.

To a large reservoir of water a horizontal tube was attached, three feet in length, and three quarters of an inch in diameter, and about the middle of this tube was made a small lateral hole, for the formation of a *jet d'eau*, the pipe being so adjusted, that the hole might be directed upwards, downwards, or sideways, by merely turning the tube on its axis. The water in the reservoir was kept to the height of four feet above the tube; and the extreme end of the latter being closed, the *jet d'eau* was immediately formed. When the hole was upwards, the jet rose very near to the surface of the water in the reservoir. The jet was obtained in like manner, whichever way the hole was turned. The end of the tube was now opened, the water began to flow out at it, and the jet ceased almost entirely. It was only observed that, when the hole was turned below, the water escaped in drops. The cessation of the jet clearly proves the cessation of the pressure of the water against the sides of the tube.

The young student may perform a similar experiment by taking a tube, (such as a pea-shooter, or a tube of paper will do,) and making a hole in the side. Then, if we put one end of this tube in the mouth, and stop up the other end, and blow, the air will rush out at the side-hole; but, if we open the lower end, we shall, on blowing, be scarcely able to feel the air coming out from the side-hole. In the one case the air from the side-hole will blow out a candle; which it will not do when the tube is open at both ends.

The reason then why the upper card cannot be blown off is this; the first impact of the blast tends, of course, by its momentum to force off the upper card; and, if this be not done at once, the current of air spreads out into a film, and escapes at the circumference of the discs, and in so doing its motion is altogether lateral,—the pressure of which, as we have seen, amounts to nothing: therefore the disc is not removed, because there is, in fact, no force to effect its removal

This little experiment, trifling as it may appear, is, however, of first-rate importance, and may possibly serve to throw light upon some of the terrific explosions of steam-boilers. It is possible, under certain conditions, that the blast of steam which escapes at the safety-valve may become reduced to a thin film with a lateral motion, and consequently without pressure; so that the valve, instead of being lifted up, to allow a full and free vent to the steam, may become attracted, which attraction would increase with the elasticity of the steam, and so precipitate the danger which the valve was intended to counteract.

THE disappointment of those who look for a detailed account of geological phenomena in the Bible rests on a gratuitous expectation of finding therein historical information respecting all the operations of the Creator, in times and places with which the human race has no concern; as reasonably might we object, that the Mosaic history is imperfect, because it makes no specific mention of the satellites of Jupiter, or the rings of Saturn, as feel disappointment at not finding in it the history of geological phenomena, the details of which may be fit matter for an encyclopædia of science, but are foreign to the objects of a volume intended only to be a guide of religious belief and moral conduct.

We may fairly ask of those persons who consider physical science a fit subject for revelation, where revelation might have stopped, without imperfections of omission, less in degree, but similar in kind, to that which they impute to the existing narrative of Moses? A revelation of so much only of astronomy as was known to Copernicus would have seemed imperfect after the discoveries of Newton; and a revelation of the science of Newton would have appeared defective to La Place; a revelation of all the chemical knowledge of the eighteenth century would have been as deficient, in comparison with the information of the present day, as what is now known in this science will probably appear before the termination of another age. In the whole circle of sciences, there is not one to which this argument may not be extended, until we should require from revelation a full developement of all the mysterious agencies that uphold the mechanism of the material world. Such a revelation might indeed be suited to beings of a more exalted order than mankind; and the attainment of such knowledge of the works, as well as of the ways, of God, may perhaps form some part of our happiness in a future state; but unless human nature had been constituted otherwise than it is, the above supposed communication of omniscience would have been imparted to creatures, utterly incapable of receiving it, under any past or present, moral or physical condition of the human race; and would have been also at variance with the design of all God's other disclosures of himself, the end of which has uniformly been, not to impart intellectual but moral knowledge.—*Bridgewater Treatises.*

THE morality of an action depends on the motive from which we act. If I fling half-a-crown to a beggar, with intention to break his head, and he picks it up, and buys victuals with it, the physical effect is good; but with respect to me the action is very wrong.—JOHNSON.

ATH OF GUSTAVUS THE THIRD, KING OF SWEDEN.

ANKARSTRÖM EXPOSED TO PUBLIC VIEW AT STOCKHOLM.

of the most remarkable events in the history of pe, during the last century, was the murder of avus the Third, King of Sweden. Sweden is a try which, by its northern situation, is very much ved from the grand political events, of which al Europe is so often the theatre; and for that n, we, in this country, hear much less frequently e Swedes than of most other European nations. circumstances of that country, however, in the entury, presented much that is interesting; and urder of the king, at the latter end of the cen- has formed materials for the dramatist, as well r the historian. We will give a rapid sketch of ircumstances which led to the murder of a rch, who seems to have ill deserved such a fate. stavus the Third was the son of Adolphus Fre- k, king of Sweden, and was born on the 24th nuary, 1746; and on the 12th of February, , he succeeded his father on the throne. At the d of his accession, the supreme authority, in con- nce of abuses which had crept into the govern- , resided in a tumultuous assembly of four s or classes, into which were admitted tradesmen, even peasants. Although statutes were signed e king, and ordinances were issued in his name, possessed no veto or negative; and if he refused n a decree, the public seal was affixed without rmission. The king was, in short, only an in- ent in the hands of one or two great parties, divided and governed the kingdom among elves, and were detested by the people.

Under these circumstances, Gustavus determined to place the power of the monarch in a more respectable and fitting condition, and to remove it from being the football of opposing and ambitious parties. He began by obtaining the support and goodwill of the militia, and by promoting subalterns of merit. His brother traversed the country, and gained the support of the military commanders. With the aid of these supporters, and possessing the love and affection of his subjects, he was enabled to effect a great change in the mode of governing the country. He abrogated the old constitution, and established another which removed the nation from the violent and contending ambition of the nobles, without infringing upon the privileges of the people, excepting in a minor degree.

His power became greatly increased by this new order of things; but it is generally admitted that he employed it for the good of his people. He took care that the law should be administered with strict impartiality to the poor and to the rich, and made severe examples of such judges as were proved to have made the seat of justice the source of venality. He was the encourager of commerce, was a liberal and enlightened patron of learning and science, and laboured strenuously to introduce into his kingdom the most important improvements in agriculture, that had been adopted in other countries. Having attended to the arts of peace, he began to consider how he could best provide for the restoration of his fleet and army, which he found in a feeble state. Desirous of diffusing learning among his subjects, he gave every encouragement to the pursuit of the arts and sciences, and to the *belles lettres*. He procured a good translation of the bible, by eminent scholars, and he invited men of talent to employ their pens in the production of elementary works on all subjects. He was himself a man of excellent talents. To a great fund of natural eloquence he united the most insinuating manners; and it is said that the extent of his knowledge, and the solidity of his judgment, excited the admiration of those who had access to him.

Such was Gustavus after he had made a change in the Swedish constitution; and it is not surprising that he continued to be a favourite with the mass of the nation. But the nobles, who had been discomfited, retained a bitter animosity against the king, and lost no opportunity of showing it. He had appointed Count Lowenhaupt to be Marshal of the Diet, and the latter was so grossly insulted by the nobles that he absented himself from his duty. These repeated instances of opposition led Gustavus to the adoption of a plan which has brought censure upon him from those who would otherwise admire his character. In February, 1789, the king, in person, appeared in the Assembly, and demanded satisfaction for the insult offered to his marshal. A violent altercation ensued between the king and the nobles, and the latter rose in a body, and quitted the assembly, leaving the king and the other states together.

For three days Stockholm was in a state of confusion; but on the fourth, the houses of all the nobility were surrounded at the same instant, and the nobles were arrested and sent as prisoners to the castle of Frederickshoff. From this moment Gustavus abolished the senate, and supplied its place by a new court, which was endowed with large powers, but subject entirely to the king. Thus, whatever provocation he might have received from the nobles, he laid himself under the odium of becoming a despotic monarch by this act.

It was about this period that Europe was thrown into commotion by the events occurring in France.

The revolution was just then beginning to acquire that serious aspect which was the forerunner of so much that was cruel and horrible. Gustavus entered into a league with those European powers that opposed the revolutionary proceedings of France. The necessity for raising troops, and providing all the munitions of war, obliged him to press rather heavily on his subjects for taxes, and the discontented nobles seized upon this circumstance to alienate the feelings of the people from the king, and there were repeated disputes and exhibitions of angry feeling between the king and the nobles: and it has even been hinted that some members of the royal family were not backward in joining the dissatisfied nobles.

By the month of March, 1792, affairs between him and his opponents assumed a more serious aspect. On the 16th he received an anonymous letter, warning him of his immediate danger from a plot that was made to take away his life, requesting him to remain at home, and to avoid balls and other assemblies for a year, and assuring him that if he should go to the masquerade that evening, he would be sure to be assassinated.

The writer of this letter was not then known; but the information conveyed proved ultimately to be correct. It appears that a conspiracy was set on foot by Count Horn, Count Kibbing, and Colonel Lilienhorn, and that a nobleman named Ankarström, whom he had personally offended, undertook to assassinate the king. Ankarström had been an ensign in the king's guards, but left the service at the age of twenty-four, having obtained the honorary or brevet rank of captain in the army; after which he retired to his patrimonial estate. Ankarström was one of those who conceived a dislike for the king: but it is believed that that animosity did not arise from the king's conduct against the nobles, on the occasion of the first revolution; but on the assumption of despotic power, on the occasion of dissolving the senate. Ankarström spoke strongly, in the presence of the king, on the occasion of the dissolution of the senate, and was imprisoned by the king, for having addressed an assembly of peasants, against the royal measures.

These, and other circumstances, led Ankarström to the determination of murdering the king: and it appears that he planned this without concerting with any one else; but upon finding Horn, Kibbing, and Lilienhorn were much of his way of thinking, they concerted a plan together. They first tried to seize the king's person: but being thwarted in that plan, they proposed to murder him at a masked-ball, which was to be given, at the opera-house at Stockholm, on the day to which we have before alluded; and it was to this masked-ball that the anonymous letter, sent to the king, referred.

The king treated the anonymous letter with contempt, and went, in a domino dress, into the ball-room, at a late hour. After some time, he sat down in a box near Count D'Essen, and observed that he was justified in his contempt for the letter; since, had there been any design against his life, no time would be more favourable than that moment. He then mingled, without apprehension, among the crowd; and just as he was preparing to retire, in company with the Prussian ambassador, he was surrounded by several persons in masks, and Count Horn accosted the king, saying, "Good day, fair Mask!" At these words, which were the signal agreed upon, Ankarström fired a pistol, and dangerously wounded the king in the thigh, or, as some say, in the back. A scene of dreadful confusion immediately ensued. The conspirators, amid the general tumult and alarm, had time to retire to other parts of the room; but one of them had previously dropped his pistols and dagger close to the wounded king. The armourer, whose name was on these instruments, deposed that he had lately sold them to Ankarström; and on this being made known, an order was sent for the immediate arrest of Ankarström, who was seized in his bed, with his wife, who was quite ignorant of all that occurred, sleeping peacefully by his side.

The king, after being wounded, was conveyed to his apartment; and the surgeon, after extracting the ball and some slugs, gave favourable hopes of his recovery. The reports of his medical attendants soon proved to be fallacious, and on the 29th of March he expired, and on opening his body, there were found within the ribs a square piece of lead, and two rusty nails. He died with great firmness, and in his last moments he desired that all the prisoners, except the person who perpetrated the sanguinary deed, might be pardoned. Many persons were arrested and tried, two of whom destroyed themselves, and Counts Horn and Kibbing, and Colonel Lilienhorn, were banished for life. For Ankarström a different fate was reserved.

On his first examination he was subjected to the torture; but he was afterwards tried before the ordinary tribunals. He acknowledged his crime, but denied having any accomplices. He, however, confessed that several persons knew of his determination.

On sentence of condemnation being passed against him, he was carried to the *Place de Ridderholm*, an open square, or "place," in Stockholm, and exposed upon a scaffold, raised for the purpose, in front of the Senate-House, upon the left of the pedestrian statue of Gustavus Vasa, and at the end of a street which terminates in the square. The throng of spectators was immense. Several detachments of cavalry, with drawn sabres, preceded the cart in which Ankarström, surrounded by executioners, was conveyed from his prison. The streets were lined with infantry.

After being publicly flogged, he was chained to a post, and left exposed, for several hours, to the view of all the people. Over his head was fastened, in a conspicuous manner, the dagger and the two pistols with which he went to the masquerade; and over all appeared this inscription, in the Swedish language:—ASSASSIN OF THE KING. When Dr. Clarke visited Stockholm, several portraits of him were to be had in the shops, and one of them represented him as he was chained to the post in the public place. This was copied by Dr. Clarke, and it also forms our frontispiece. Clarke says that this was considered an admirable likeness of the man. He was five feet two inches high; his hair was black, short, and frizzled; his nose aquiline, and he had a firm and lofty expression of countenance; regarding the vast throng of spectators with an unmoved appearance of calmness and indifference.

He was exposed to public view for three days. Upon the fourth day his right hand was struck off; after which he was beheaded, and his body separated into four quarters.

In the fever and excitement which attended the public mind at the sudden murder of the king, many persons looked at it as a glorious deed, and wrote verses commemorative of the exploit of Ankarström, and lamenting his fate. But the calm eye of the historian, which can detect the proper light, in which a subject should be viewed, uninfluenced by the warm feelings that agitate all parties immediately after such a deed, has seen, that even if murder were permitted to man, as an instrument of revenge, (which we all

know it is not,) Gustavus was not deserving such a fate. Like many other men, as he acquired power, he was eager for more, and suffered his ambition to lead him to acts which were contrary to the principles which distinguished the earlier years of his reign. But still he was a kind and valuable king to the mass of his subjects; and his constant endeavours, throughout his reign, to advance science, art, manufactures, literature, agriculture, and all that is useful in a state, show that his heart was alive to the improvement and well-being of his country generally. And it is probable, that had he not been driven and goaded onwards by the opposition of ambitious men, and his good sense somewhat warped thereby, he would not have taken those steps, in the latter part of his reign, which have caused him to be looked upon as a despotic monarch, different from what he wished to be and appear, in the earlier part of his reign.

The largest merchant-vessel in Java, a ship about one thousand tons burden, was built by an Arab merchant, in a long but shallow river, which runs into the sea near Sourabaya. As great expense is incurred by floating the timber in rafts down the river, he determined to commence the work in the forest itself, as he would thereby be enabled to select the best trees for the purpose. He accordingly ascended the river, accompanied by a sufficient number of workmen, conveying the necessary materials, and commenced the undertaking about eighty miles from the sea. When the keel, and the floor timbers were laid, and a few of the bottom planks nailed on, he launched the embryo vessel, and floated her gently down the river to a place in which the water was deeper. Here the building was continued, until it became necessary to seek a deeper channel: and in this manner the work proceeded, the vessel being floated further down the river whenever the water was found to be too shallow for her to float, until at length she was fairly launched, half finished, into the sea, and completed in the harbour.—Earl's *Voyages*.

EXTRAORDINARY POWER OF MEMORY.

Seneca is reported to have been able to repeat two thousand verses at once, in their exact order, and then rehearse them backwards, with so much precision as not to miss a single word or syllable. Cyrus had a memory so exceedingly tenacious, that historians say he could call every soldier in his immense armies accurately by name. Mithridates, who was the ruler of twenty-three nations, speaking different languages, could converse with all of them in their vernacular tongue. A Corsican boy could rehearse forty thousand words, whether sense or nonsense, as they were dictated, and afterwards begin with the last word, and repeat them backwards without a single mistake. Dr. Wallis extracted the cube root of *three*, even to thirty places of decimals, solely by his memory. Magliabechi, an Italian, who read most of the books written in his lifetime, could tell what was the subject of each author, quote the chapters, sections, and pages, in which any particular subject was expressed; besides this, he could repeat even the writer's own words. A gentleman loaned him a manuscript to examine, and afterwards pretended he had lost it, when, to his utter amazement, Bechi wrote it word for word, by the mere strength of his memory, although he read the article but once. Euler lost his sight in 1783, yet carried on his complicated and abstruse mathematical calculations on the inequalities of the planetary motions, and composed a treatise on algebra, by dint of his astonishing memory. He could, moreover, repeat the Æneid of Virgil from beginning to end, and tell the first and last line of every page in the edition which he had read before he became blind. Whitfield is said to have been so familiar with the Scripture, that he could repeat the whole Bible without mistake. A physician who died a few years since, in Massachusetts, could repeat the *Paradise Lost* of Milton in his old age, though he had not read it for twenty years.

Every look, every movement, every expression, does something towards forming the character of the little heir to immortal life.—Mrs. Child.

THE VIRGINIAN COWSLIP.

(*Dodecatheon Meadia.*)

What sudden pleasure, when some object rare,
Confined peculiar to one soil and air,
More precious far from expectation grown,
By some blessed turn upon the sight is thrown!—Delille.

The delight with which the botanist views a newly-discovered plant can only be conceived by the students of nature; it seems to expand his ideas, and give him new conceptions of the wisdom of the Great Creator. He contemplates with admiration the harmony of its parts, which he finds so happily adapted to its native situation on the globe; he learns by the character of the plant the climate to which it belongs, and he soon conceives the utility of the individual plant to the grand link of vegetation by which the animal world is supported. He deems it as the most important event of his life, and he joyfully bestows on it the name of some esteemed friend, or eminent countryman; his fancy pictures it growing under cultivation with his native plants; his immediate acquaintance covet it for his sake, and his name is justly registered amongst those who have benefited their country by peaceable pursuits.

The plant, of which we are about to speak, is indigenous to the Columbian world, that vast field from which such store of novelty has been poured into the more known quarters of the globe. It grows in several parts of North America, and was first sent from Virginia by Banister to Bishop Compton in the year 1704; and Miller mentions having seen it in blossom at his lordship's garden at Fulham in the year 1709. After which, the plant was lost for several years in England, till it was again obtained from America, by Mr. Catesby, about the year 1744.

Mr. Mark Catesby, in his Natural History of Carolina, gave it the name of *Meadia*, in honour of Dr. Richard Mead, an English physician of that day, who, like some of the present time, was courted by the wealthy, and adored by the needy of his country, whilst his name was revered by the eminent of all parts of Europe.

On this account we feel a regret that Linnæus should have thought it necessary to change the generic term of this plant from that of *Meadia*, and more particularly so since the one he has bestowed on it seems as inappropriate, *Dodecatheon* being derived from two Greek words, which mean twelve gods; and the only cause he could have for adopting so whimsical a name, was from the observation that each of these plants generally produced twelve corollas. *Meadia*, however, remains as the specific name for the plant, of which there has not yet been a second species discovered. The French have given it the name of *Gyroselle de Virginie*, in addition to that of *Dodecatheon Meadia*.

This elegant plant flowers about the end of April, or the beginning of May; the stalk, after rising up to about eight inches in height, throws out an umbel of flowers, gracefully pendant, as rockets appear, when thrown out of an elevated piece of fire-work.

The petals of the flower are of a rosy lilac, inclining to the colour of the peach or almond blossom; and they are reflexed, or turn back over the calyx, giving the appearance of an half-expanded parasol, which resemblance is considerably heightened by the long tapering shape of the parts of fructification, and the golden colour of the anthers.

The Dodecatheon should be planted in a shady situation, where the earth is of a loose, moist nature; but its beautiful delicacy and graceful formation make it deserving a situation even amongst the plants that are potted for the house.

It is easily propagated by offsets, which should be taken from the old plants in the month of August, that they may be fixed well to the earth before the frost comes on. It is increased more rapidly from seed, which the plant generally produces in plenty; these should be sown soon after they are ripe, either in pots or a shady border. If these plants are much exposed to the sun whilst young, they are almost sure to perish, so impatient are they of heat. Many persons have lost their stock of these plants by planting them in dry soil in the most sunny parts of the garden, without reflecting from what latitude they were originally brought, or recollecting the lines wherein Milton tells us,

> ——— Nature's boon
> Poured forth profuse on hill, and dale, and plain,
> Both where the morning sun first warmly smote
> The open field, and where the unpierced shade
> Imbrowned the noon-tide bowers.
>
> [PHILLIPS' *Flora Historica.*]

AN EPISTLE IN RHYME,

FROM COWPER THE POET, TO HIS FRIEND THE REV. JOHN NEWTON.

My very dear friend, July 12, 1781.

I am going to send, what when you have read, you may scratch your head, and say, I suppose, there's nobody knows, whether what I have got, be verse or not; by the tune and the time, it ought to be rhyme; but if it be, did you ever see, of late or of yore, such a ditty before? The thought did occur, to me and to her, as madam and I, did walk and not fly, o'er the hills and dales, with spreading sails, before it was dark, to Weston Park.

The news at *Oney* is little or noney; but such as it is, I send it, viz.: Poor Mr. Peace cannot yet cease, addling his head with what you said, and has left parish-church quite in the lurch, having almost swore to go there no more.

Page and his wife, that made such a strife, we met them twain, in Dog-lane; we gave them the wall, and that was all. For Mr. Scott, we have seen him not, except as he pass'd, in a wonderful haste, to see a friend at Silver End. Mrs. Jones proposes, ere July closes, that she and her sister, and her Jones mister, and we that are here, our course shall steer, to dine in the Spinney; but for a guinea, if the weather should hold, so hot and so cold, we had better by far, stay where we are. For the grass there grows while nobody mows, (which is very wrong,) so rank and long, that so to speak, 'tis at least a week, if it happens to rain, ere it dries again.

I have writ Charity not for popularity, but as well as I could, in hopes to do good; and if the Reviewer, should say "to be sure, the gentleman's Muse, wears methodist shoes; you may know by her pace, and talk about grace, that she and her bard have little regard, for the taste and fashions, and ruling passions, and hoidening play, of the modern day; and though she assume a borrowed plume, and here and there wear a tittering air, 'tis only her plan, to catch if she can, the giddy and gay, as they go that way, by a production, on a new construction. She has baited her trap in hopes to snap all that may come, with a sugar plum."

——— His opinion in this, will not be amiss; 'tis what I intend, my principal end; and if I succeed, and folks should read, till a few are brought to a serious thought, I shall think I am paid, for all I have said and all I have done, though I have run, many a time, after a rhyme as far as from hence, to the end of my sense, and by hook or crook, write another book, if I live and am here, another year. I have heard before, of a room with a floor, laid upon springs, and such like things, with so much art, in every part, that when you went in, you was forced to begin a minuet pace, with an air and a grace, swimming about, now in and now out with a deal of state, in a figure of eight, without pipe or string, or any such thing; and now I have writ, in a rhyming fit, what will make you dance, and as you advance, will keep you still, though against your will, dancing away, alert and gay, till you come to an end of what I have penn'd; which that you may do, ere madam and you, are quite worn out, with jigging about, I take my leave, and here you receive a bow profound, down to the ground, from your humble me, W. C.

P.S. When I concluded, doubtless you did think me right, as well you might, in saying what I said of Scott; and then it was true, but now 'tis due to him to note that since I wrote, himself and he has visited me.

[WILLMOTT's *Letters of Eminent Persons.*]

THE ANCIENT EGYPTIANS.

FROM the frequent representations of entertainments on the monuments, it is manifest that the Egyptians were a very social people: they appear to have neglected nothing which could tend to promote festivity,—music, songs, dancing, feats of agility, and games of chance, filled up the space, between the coming of the guests and the serving of the feast. Visiters of high rank arrived in palanquins, or chariots, escorted by numerous attendants, some of whom acted the part of running footmen, as was once the fashion in England. Before entering the festive chamber, water was provided for the hands and feet of those who arrived from a distance: the want of gloves, and the open sandals used for the feet, rendered this practice general among most ancient nations. On some occasions, clothes were provided for the guests; and neglecting to use them was considered an act of disrespect to the host. The guests were then anointed with a perfumed unguent; and this custom, which appears to have been borrowed, from the Egyptians, by the Jews, was practised in Palestine so late as the period of our Saviour's ministry. So perfect were the Egyptians in the manufacture of perfumes, that some of their ancient ointment, preserved in an alabaster vase, in the museum of Alnwick Castle, retains a very powerful odour, though it must be between two and three thousand years old. Necklaces of the lotus-flower were also hung round the necks of the guests, and bouquets of this favourite flower were constantly renewed by servants, as those in the room faded from heat or handling. Wine was served at the beginning of an entertainment, as is still the custom in China. In general the guests sat erect, but couches were provided for those who preferred a reclining posture. The most singular custom among the Egyptians was to introduce during, or after, their feasts, a wooden image of Osiris, in the form of a human mummy, sometimes erect, and sometimes extended on the bier,—as a solemn warning of the brevity of life, and the vanity of all sublunary enjoyments.

DUTY is far more than love. It is the upholding law through which the weakest become strong, without which all strength is unstable as water. No character, however harmoniously framed and gloriously gifted, can be complete without this abiding principle: it is the cement which binds the whole moral edifice together, without which all power, goodness, intellect, truth, happiness, love itself, can have no permanence; but all the fabric of existence crumbles away from under us, and leaves us at last sitting in the midst of a ruin,—astonished at our own desolation.—Mrs. JAMESON.

LONDON.
JOHN WILLIAM PARKER, WEST STRAND.
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Pennant says,

The hard fare of the inhabitants seems to have been no impediment to the population, nor to longevity. The inhabitants live to a great age, and are liable to very few distempers. Men of *ninety* work; and there is now living a woman of eighty, who can run down a sheep. The account given by Martin, of Gillour Maccrain, was confirmed to me. His age exceeded that of either Jenkins or Parr; for he kept one hundred and eighty Christmasses in his own house, and died in the reign of Charles I. Among the modern instances of longevity, I forgot to mention John Armour, of Campbelltown, aged one hundred and four, who was a cockswain in our navy at the peace of Utrecht, and within these three years was stout enough to go out shooting.

Pennant describes the *Sheelins*, or huts of the peasants, as being scattered over the island. He saw a group of them, of which, some were oblong, others conical, and all so low, that they can only be entered by creeping through the little opening, which has no other door than a fagot of birch twigs, placed there occasionally. They are constructed of branches of trees, covered with sods; the furniture, a bed of heath, placed on a bank of sod;—two blankets and a rug;—some dairy vessels;—and a few hanging shelves, made of basket-work, to hold the cheese which is made during the summer.

One of the most remarkable features in the island consists in the mountains called, from their peculiar shape, the *Paps*; of which, one is called Beinn-a-Chaolois, or the Mountain of the Sound; another, Beinn-Sheeunta, or the Hallowed Mountain, and a third, Beinn-an-Air, or the Mountain of Gold. Pennant describes the ascent of the last mentioned-mountain as one of great difficulty; the surface being composed of vast stones, slightly covered with moss near the base, but all above bare, and unconnected with each other. When he gained the top, he found his fatigues fully recompensed by the grandeur of the prospect from the summit. Jura itself afforded a stupendous scene of rock, varied with innumerable little lakes. From the west side of the hill ran a narrow strip of rock, terminating in the sea, called the "side of the old hag." Such appearances are very common on this island, and in several parts of the north of both Scotland and Ireland: they are supposed to be of volcanic origin, being beds of lava of various widths, from three feet to nearly seventy. Their depth is unknown; and they extend for miles, cross the sound, and often appear on the opposite shores. They frequently appear three or four feet above the surface of the ground, forming natural dykes, or boundaries, called "Whin-dykes." The fissures have been left empty from very early times. It is impossible to fix a period when the volcanic eruption happened which formed these dykes, but it must have been many ages ago.

On the summit of the mountain Pennant found several lofty *Cairns* *, not the work of devotion, but of idle herds of curious travellers. Even this vast heap of stones was not uninhabited: a hind passed along the sides at full speed, and a brace of ptarmigans were seen near the summit. Sir Joseph Banks found one of these Paps to be 2395 feet high, and another of them still higher.

We will now pass on to more modern times, and speak of the island as described within the last few years. Dr. Macculloch says

The aspect of the island is rugged and mountainous, and it may, in a general sense, be considered as a continued mountain-ridge, since it can scarcely be said to possess a valley, or to terminate in any other plain than that of the surrounding ocean. The shores, therefore, as might be expected, partake of this general character, being commonly rocky and often abrupt, seldom descending to the sea in gentle slopes or flat meadows. Under these circumstances, Jura is almost void of picturesque beauty, if we except the cliffs, the caverns, and the arches, which are to be seen on several parts of the coast. The highest part of the island lies towards the south, where it rises into four distinct hills, of which, the three principal are well known by the name of the *Paps*, being seen far at sea and from all the Western coast of Argyleshire. They have all an irregularly conical form, sometimes displaying considerable portions of the naked rock; but being more frequently enveloped with heaps of large fragments which conceal it, and give a smooth outline to the declivities.

In other descriptive details, Macculloch agrees sufficiently with Pennant.

To the north of Jura, in the sound between it and Scarba, lies the famous whirlpool of Corrybhreaccain, from Bhreaccain, a son of the king of Denmark, who perished amid its waves. The strait is about a mile broad, and the whirlpool is on the Scarba side. When the flood has entered the sound, the sea appears in great commotion at the place of the whirlpool. It boils and foams, and rolls away in successive whirls. At the fourth hour of the flood, the commotion reaches its maximum, and throws up, with dreadful ebullitions, everything from the bottom. The roar of the waves is frequently heard at the distance of six or seven miles. At this time, it is generally fatal to approach the gulf; but from the middle of the fifth hour, to the sixth of the flood, and in neap tides from the fourth to the sixth, the commotion gradually subsides, and the smallest boat may pass in safety. After the return of the ebb, however, the same phenomena are repeated, increasing and diminishing at corresponding times, till the commotions again subside at the approach of the lowest ebb.

The inhabitants of Jura, which now probably amount to about fifteen hundred, live chiefly in scattered huts, there being only one village on the island—called after the name of the island, Jura, and which is inhabited by fishermen. The remainder of the inhabitants, who live on the eastern part of the island, cultivate oats, barley, potatoes, and flax. About one-nineteenth part of the island was under regular or occasional tillage, a few years ago; but the system of improvement which had found its way into some of the other islands, had not yet reached Jura. Potatoes are cultivated with care, and form four-fifths of the nourishment of the inhabitants.

The inhabitants of Jura, as well as of some others of the Western Isles, are a very superstitious race. They believe in the existence of the *fillau*, a worm which is said, like the Guinea-worm, to insinuate itself under the skin, so as to cause tumours and abscesses. On investigation, this pretended origin of those diseases is found to be purely imaginary, and like many other supposed causes of Highland ailments, founded on traditionary tales. Supernatural or extraordinary causes of disease are, in the infant state of society, not limited to witchcraft alone. But, as Macculloch observes,

These notions are fast hastening to oblivion, and with them, superstitious and fantastical methods of cure are also disappearing. The increase of rational knowledge, and of a portion of common-place philosophy, which, however insensibly, is still slowly and regularly diffusing itself throughout the people, will shortly dismiss the *fillau*, together with many similar creeds, to the general repository of forgotten systems.

One of the popular superstitions here alluded to is that of the existence of the *water-bull*, which some of the highlanders stoutly affirm that they have seen. He is supposed to reside in several of the lakes, such as Loch Awe, and Loch Ramoch. He is occasionally angled for with a *sheep* made fast to a cable secured round an oak; but no tackle has been found

* The term *cairn*, or *carn*, is Gaëlic, meaning properly a heap of stones thrown together in a conical form; but is often applied to a rocky Mountain, as *Cairn*-gorm in Invernesshire, the blue stoney *mountain*.

strong enough to catch him. Dr. Macculloch found a farmer and his sons occupied in a no less extraordinary mode of capturing, or rather killing the water-bull. The two sons were busily engaged in digging and exploring in some deep holes where the bull was supposed to be, with a pitch-fork; while the father was keeping a strict watch with a musket loaded with *sixpences*, for it is agreed among the peasants, that the monster is vulnerable to silver shot only

We must here close our notice of Jura, and of the various objects which it offers to the attention of the traveller.

ON EMERY.

If we were to make out a list of substances which perform an important part in manufactures and in the social arts generally, we should have to include many ingredients which we are apt to regard, at a first glance, as somewhat humble in their pretensions. Among such may be reckoned *emery*, a powder with which most persons are more or less familiar. This substance used formerly to be ranked among the ores of iron; but it is found to contain not one-twentieth part of its weight of that metal: it belongs to the class of stoney substances, and is a species of *corundum*.

The most remarkable property of emery, and that which gives it so much value in the arts, is the extreme hardness of the particles which compose it,—a hardness which is still preserved when it is reduced even to an impalpable powder. This powder has the property of grinding away the hardest bodies, even oriental gems: it is with emery-powder that lapidaries cut and polish rubies, sapphires, and all other precious stones, with the single exception of the diamond, which can only be polished by its own dust, and which dust can only be obtained by rubbing two diamonds against each other; or by pounding a diamond in a hardened steel mortar.

Emery is equally serviceable in grinding down the surfaces of all hard bodies which are to receive a polish. A great quantity is used in various kinds of glass polishing, and other processes of a similar kind. In these cases the workman begins with using ground flint, then emery, and at last tripoli-powder.

When emery is employed, it ought to be prepared of different degrees of fineness, according to the nature of the substance to which it is to be applied. The harder that substance may be, the finer should be the emery-powder; for if we employ very fine emery to such a substance as glass, which is not so hard as the precious stones, the particles of emery will soon be enveloped in the particles of glass which are detached, and the rubbing action of the former will then cease. To obtain these different degrees of fineness in emery-powder, the substance is first pulverized, and then repeatedly washed in water.

It is by means of emery-powder that the convex and concave lenses for telescopes and other optical instruments are ground. A grinding tool of a particular shape is covered with coarse emery, and the grinding effected to a certain extent; it is then washed off, and a new coating of finer emery is employed; which is afterwards to be replaced by some still finer.

Emery of different degrees of fineness, (says Sir David Brewster,) may be made in the following manner. Take five or six clean vessels, and having filled one of them with water, put into it a considerable quantity of flour-emery. Stir it well with a piece of wood, and after standing for five seconds, pour the water into the second vessel. After it has stood about twelve seconds, pour it out of this into a third vessel, and so on with the rest; and at the bottom of each vessel will be found emery of different degrees of fineness, the coarsest being in the first vessel, and the finest in the last.

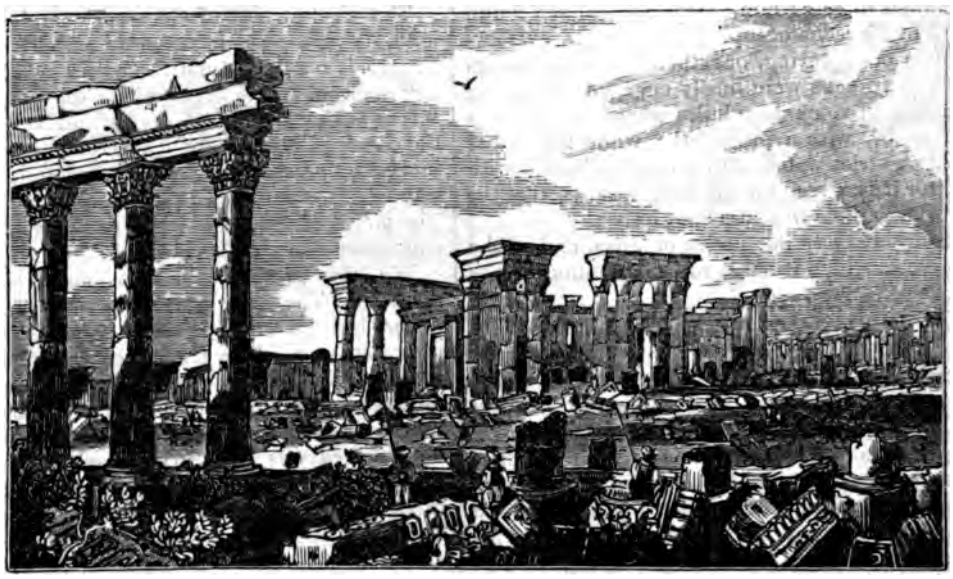
The greatest part of the emery employed in England, as well as that which is sent from England to France, is obtained from the island of Naxos, in the Archipelago. It is prepared for the use of manufacturers in the islands of Jersey and Guernsey, upon the coasts of Normandy. The best emery is found in Spain, near Alcocer, in Estramadura, in a mountain called *Hares*, composed of quartzose sandstone. The pieces of emery which it contains are black, and somewhat resemble hæmatite.

We have already said that emery is a species of *corundum*. The latter mineral presents itself in various forms, but the whole of them are distinguished for their hardness. The granulated corundum, or emery, presents a blackish colour, like certain ferruginous minerals; combined often with a cloudiness, sometimes blueish, sometimes reddish: it is about four times as heavy as water. The massive corundum, when very pure, sometimes presents a tinge of red inclining to violet. It, however, seldom consists of pure emery. The rock generally contains oxide of iron in distinct grains: it also often contains mica, and laminæ of talc, in which case the emery shows itself in the form of small grains or crystals. It was Mr. Tennant who first remarked, that the hard stone, known by the name of emery, belonged to the minerals called corundum.

We have described Sir D. Brewster's mode of preparing the emery-powder. The mode of effecting the same object in Jersey, as detailed by a French writer, is somewhat different. The emery is pounded in a steel mortar, and the bruised mass thrown into water, and stirred up with it: this is left to repose until the water contains nothing but particles which are too fine and minute to be of service, when the water is thrown away. New water is poured on the emery, and stirred up with it; and after remaining half an hour, it is poured off while still turbid: by this means the finest sort of emery is procured. A fresh supply of water is added, and allowed to rest a quarter of an hour; when, being poured off, the next degree of fineness in the emery is obtained. Another supply of water being left to stand eight minutes, produces a third quality; and similarly, by allowing successive portions of water to stand four minutes, two minutes, one minute, and half a minute, emery of several different degrees of fineness is obtained.

Emery also occurs in Poland, Saxony, Sweden, Persia, &c. By Mr. Tennant's analysis, it consists of eighty parts alumina; three parts silica; and four parts iron. Another inferior kind yielded thirty-two of iron, and only fifty of alumina.

Is gratitude in the number of a man's virtues? If it be, the highest Benefactor demands the warmest returns of gratitude, love, and praise. *Ingratum qui dixerit, omnia dixit.*—If a man wants this virtue, where there are infinite obligations to excite and quicken it, he will be likely to want all others towards his fellow-creatures, whose utmost gifts are poor, compared to those he daily receives at the hands of his never-failing Almighty Friend. "Remember thy Creator in the days of thy youth," is big with the deepest wisdom: "The fear of the Lord is the beginning of wisdom; and an upright heart that is understanding." This is eternally true, whether the wits and rakes of Cambridge allow it or not: nay, I must add of this religious wisdom, "Her ways are ways of pleasantness, and all her paths are peace." Hold fast therefore by this sheet-anchor of happiness,—Religion; you will often want it in the times of most danger, the storms and tempests of life. Cherish true religion as preciously, as you will fly, with abhorrence and contempt, superstition and enthusiasm. The first is the perfection and glory of the human nature; the two last, the depravation and disgrace of it. Remember, the essence of religion is a heart void of offence towards God and man; not subtle speculative opinions, but an active vital principle of faith.—*The Earl of Chatham to his Nephew.*



THE RUINS OF PALMYRA.

"TADMOR in the Wilderness," or, as it has been called by the Greeks, "Palmyra," the City of Palms, is one of the most extraordinary specimens of ruins in the whole world, whether we regard its situation, its history, or its present condition.

Situated in the midst of the Syrian desert, about 180 miles from the coast of the Mediterranean Sea, and 60 miles from the river Euphrates, cut off, as it were, from the rest of the habitable world by the wildness and solemnity which surround it, the mind is occupied in wonder at the causes which led to the foundation of so gigantic a city in such a place,—a city with whose existing remains Greece and Italy sink into insignificance; and which seem to prove that the ancient Tadmor (if such we may call the modern ruined Palmyra,) was one of the most (if not itself the most,) celebrated cities of the world.

In the space covered by these ruins, (says a modern traveller,) we sometimes find a palace, of which nothing remains but the court and walls; sometimes a temple, whose peristyle is half thrown down; and now a portico, a gallery, or triumphal arch. Here stand groups of columns, whose symmetry is destroyed by the fall of many of them; there we see them ranged in rows of such length, that, similar to rows of trees, they deceive the sight, and assume the appearance of continued walls. If from this striking scene we cast our eyes upon the ground, another almost as varied presents itself. On all sides we behold nothing but subverted shafts, some whole, others shattered to pieces, or dislocated in their joints; and on which side soever we look, the earth is strewed with vast stones half buried, with broken entablatures, mutilated friezes, disfigured reliefs, effaced sculptures, violated tombs, and altars defiled by dust.

It seems to have been sufficiently proved, that the "place of palm-trees," the Palmyra of the Greeks, was the Tadmor in the Wilderness, built by Solomon. Considerable learning has been devoted to the inquiry into the impelling motives of this great and wise monarch for erecting a vast city at incredible pains and expense, on a spot where nature denied all help, and at a distance so remote from the habitable parts of his kingdom.

The motive seems to have been that which, in all ages, has effected such wonders; viz., commercial enterprise. Solomon had been anxious to secure himself in the possession of the ports of Elath and Ezion-geber, on the Red Sea, and to establish a navy for his Indian commerce, or trade to Ophir*, which, in all ages, was the grand source of wealth. The riches of India, thus brought into Judæa, were diffused over those countries of the north and west, which were then inhabited. Judæa thus became for a season the centre of communication between the East and West; but there had, doubtless, been an intercourse overland between the same countries. The Indian merchandize, being brought to the Persian Gulf, was sent from thence up the Euphrates, and so across the Syrian desert to the ports of Phœnicia, first to Sidon, and then to Tyre; it was then exported to the coasts of "Chittim," or the islands of the Mediterranean and the shores of Greece. In this route Palmyra must have been a most important station, offering, in the centre of the desert, a place of rest and refreshment, as well as of barter.

It appears likely then that Solomon, to prevent the riches of India from going altogether into Phœnicia, and to turn a portion of them into his own dominions, built Tadmor, and furnished it with every necessary and convenience as a place of trade, thus making it one of the many marts of eastern commerce. It enjoyed these advantages, and continued to flourish for more than a thousand years, and became celebrated for its strength and importance.

We are not informed of the fate of Tadmor for a long lapse of ages after the time of Solomon, but it is probable the Jews did not long retain possession of it. It is likely that, in common with the rest of the East, Tadmor fell successively under the Assyrian, Babylonian, Persian, and Macedonian monarchies. There is a wide hiatus in the page of history, which will probably never be filled up. We hear no more of Tadmor until just before the Christian era, when, at the commencement of the wars between the Romans and the Parthians, this city appears to have been respected by both the opposing parties, and allowed to maintain its independence and neutrality, and to enjoy the then rare advantage of a free trade. At this time, that is, within the 300 years immediately preceding its subjugation by Aurelian, it is supposed that Palmyra expended its exuberance of wealth in works of taste and magnificence, which, even up

* Commentators are not agreed about the situation of Ophir; but it seems more generally referred to Hindostan and Ceylon, with the adjacent countries.

to our own day, might have defied the rude hand of time, had not the ruder hand of the barbarian converted a splendid city into a heap of splendid ruins.

It was in the time of Adrian, A. D. 130, that Palmyra first submitted to the Roman power; but the submission being voluntary and friendly, the city was favoured by the emperor, and remained in friendly alliance with the Romans for the space of 150 years, when a strange revolution effected its ruin.

When the Emperor Valerian was captured by Sapor, King of Persia, Odenathus, a lord of Palmyra, brought a powerful army into the field to his aid, took Mesopotamia from the Persians, and penetrated as far as their capital, Ctesiphon. This service so far pleased the Romans, that Gallienus, the son of Valerian, who was afterwards cruelly put to death by Sapor, rewarded Odenathus by bestowing on him a share in the empire, which, however, he did not long enjoy, as both he and his eldest son were murdered. Zenobia, his wife, in right of his next son, Waballathus, a minor, then assumed the government of the city and its dependencies, and being a very superior woman, she conducted it with spirit and judgment; but being ambitious, she seized the government of Egypt, and retained it during the short reign of Claudius Gothicus, the successor of Gallienus. This mutilated state of the empire ill-accorded with the ambition of Aurelian, who, when he became emperor, marched against Zenobia, and defeated her in two pitched battles, besieged her in Palmyra, and conveyed her captive to Rome. After this event the Palmyrenes declared their independence, and slew the Roman garrison, which so enraged Aurelian, that he returned to Palmyra, retook it, and delivered it up to the pillage of his soldiers. From this time, A. D. 272, the city declined, but it does not appear when and by whom the city was reduced to a heap of ruins: certainly not by Aurelian, who destroyed none of its public edifices, but in all probability during the domination of the Saracens.

Such then are the principal details of our historical knowledge respecting one of the most remarkable records of past ages; let us now glean some information from modern travellers, respecting this forest of Corinthian pillars, erect and fallen.

The ruins of Palmyra, situated as they are in a vast and arid plain, which is almost constantly infested with wild and formidable Arabian banditti, have not, it may well be imagined, been very much frequented by the Oriental traveller. Indeed it would be extremely rash for any one to attempt a visit to these ruins without having first purchased permission and protection from the Arabs, and even from the robbers themselves who haunt those wilds. Lady Hester Stanhope is said to have paid no less than five hundred pounds for an escort to the ruins. Burckhardt was robbed and stripped in his first attempt to visit them; and Captains Irby and Mangles, in 1818, assuming the garb of poverty, paid 600 piasters for permission and escort, 3000 piasters having been at first demanded of them. One of the sheikhs inquired why the English wished so much to see Palmyra, and whether they were not going there in order to search for gold? These travellers say,—

Sheikh Narsah was leaning on a camel's saddle, their customary cushion. He did not rise to receive us, although we afterwards observed that he, and the whole circle, rose whenever a strange sheikh arrived. We attributed this cool reception to the low estimation he held us in, in consequence of the unusually small sum we had paid for visiting Palmyra, and from the plainness of our dress and appearance.

The various acccounts given by modern travellers of the ruins of Palmyra, are exceedingly discordant. Nor is this to be wondered at, since the taste, feelings, education, and habits of thought, are all different in different individuals. Some represent these ruins as splendid and magnificent, others as mean and paltry. These are the extremes to which human nature is but too prone: the mind warped by prejudice, or distorted by vanity or self-esteem, produces a desire of saying or doing that which none others have said or done; and hence it is that so many travellers desire rather to cavil at, and criticise, the information supplied by their predecessors, than to unite in one common cause for the advancement of truth.

Captain Mangles says,—

On opening upon the ruins of Palmyra as seen from the Valley of the Tombs, we were much struck with the picturesque effect of the whole, presenting altogether the most imposing sight of the kind we had ever seen. It was rendered doubly interesting by our having travelled through a wilderness destitute of a single building, from which we suddenly opened upon these innumerable columns and other ruins, on a sandy plain on the skirts of the desert; their snow-white appearance, contrasted with the yellow sand, produced a very striking effect.

He then speaks of his disappointment when going into detail:—

Take any part of the ruins separately, and they excite but little interest; and, altogether, we judged the visit to Palmyra hardly worthy of the time, expense, anxiety, and fatiguing journey through the wilderness, which we had undergone to visit it.

But several of our best travellers agree, in representing Palmyra as a surprising scene; the front view of which displays a range of Corinthian pillars occupying a space of more than a mile, and behind which crowds of other edifices appear in dim perspective. The grandest and most entire structure is the Temple of the Sun. The court of this temple has a wall nearly complete, in which appear twelve noble windows. The ruins of the temple rise behind, composed of magnificent ranges of Corinthian columns, supporting a rich entablature. The eastern gateway is tolerably perfect, and displays all the elaborate resources of Grecian art. To the right of this is a noble arch, forming the entrance to a superb colonnade, which may be traced for nearly 4000 feet.

At present, beneath and among all these venerable remains of a polished people, appear about thirty mud cottages, whose wretched inhabitants obtain a scanty subsistence by cultivating a few detached spots whereon to feed their goats and sheep. Two small tepid streams impregnated with sulphur, traverse the ruins, and are absorbed in the sand.

The natives firmly believe, Mr. Wood informs us, that the existing ruins were the works of King Solomon. "All these mighty things," say they, "Solyman Ebon Daoud (Solomon the son of David) did by the assistance of spirits." King Solomon is the Merlin of the East; and to the Genii in his service, the Persians, as well as the Arabs, ascribe all the magnificent remains of ancient art in those regions.

RELIGION is not so much taught by *lessons*, as it is by our examples, and habits of speaking, acting, and thinking. It should not be a garment reserved for Sunday wear. We should always be in the habit of referring everything to our Father in Heaven. If a child is reminded of God at a moment of peculiar happiness, and is then told to be grateful to him for all his enjoyments, it will do him more good than any words he can learn. To see the cherry-stone he has planted becoming a tree, and to be told that God made it grow, will make a more lively impression on his mind, than would be produced by any lesson from a book. The people called Quakers, or Friends, say every day should be Sunday, and certainly no day should pass without our using some of the opportunities which are occurring of leading our hearts to God.—MRS. CHILD.

ON THE GOITRE AND CRETINS OF SWITZERLAND.

How often do we find, that in the midst of beauties, which attract and rivet the attention of every one, there is something loathsome, distressing, or dangerous, which places a limit to the extent of our pleasure! The magnificent vegetation of tropical climes loses part of its attraction for us, in the dread which wild and venomous animals—the inhabitants of such climates—are calculated to excite: the fruitful rains of India and Africa cannot hide from the dwellers in those lands that a dry season will afterwards arrive, when parching sands will refuse passage to streamlets flowing through them, and all is hot and sterile.

So it is with the condition of the human race generally. There is no spot so lovely, but that it is found to be unfortunate or insalubrious for some persons: often the very circumstances which give the prevailing beauty to a tract of country are precisely those which most influence the health of the inhabitants. But to proceed to the object of this article:

Switzerland is a country which has in an eminent degree attracted the attention of travellers, by the lofty sublimity of its mountains, the vast glaciers, the beautiful valleys that intersect the ranges of mountains, and the simple, hardy, and independent character of the inhabitants. Yet there are some parts of this country in which a portion of the inhabitants are grievously afflicted with disorders, which appear to be caused by some natural peculiarity of the country which they inhabit. Persons afflicted with the two diseases to which we here allude, are called respectively *goîtres* and *crétins*.

Goîtres are persons who have a swelling in the upper and fore part of the neck, often of an enormous size; and *crétins* are individuals who are more or less afflicted with idiocy, sometimes to a most deplorable extent.

Goître is a name commonly applied to the glandular swelling itself, to the disease which occasions it, and to the individual who is afflicted with it. There is a somewhat similar disease in some parts of Derbyshire, and which is there called the "Derbyshire neck." The tumour or swelling, which constitutes the goître, is generally free from pain, and is of the same colour as the skin. When it first appears it is soft, spongy, and elastic; but it afterwards assumes a more firm and fleshy character, yet not equally so in all its parts; and it gradually swells out towards the sides of the neck, forming a hideous deformity. When it has grown to a large size, it hangs down from the neck on the breast. The interior of the tumour, when examined, appears to consist of innumerable cells, all filled with a peculiar kind of fluid.

With regard to *crétins*, most of them are at the same time *goîtres*; although it is not at all a rule that the converse of this is true; viz., that goîtres are generally crétins; since many have goîtres without being deficient in intellect. The crétins have various degrees of idiocy. Some are able to walk about and attend to some easy labour, and make themselves understood by others; while the intelligence of others seems actually below that of the brute creation: they cannot articulate distinct sounds, but make a sort of cry or whining, or else burst out into a vacant laugh; while they are as helpless as infants, being either carried about in the arms of one who has the wretched office of nursing them, or are left to crawl or roll on the floor, with infinitely less intelligence than a dog or a cat. All their instincts and feelings are purely of an animal nature, and of the lowest kind; for they are incapable of affection, or even of recognising the *persons who are with them*. It must be remembered that we are here speaking of the worst kinds of crétins.

The existence of crétins and goîtres in the same country, or the same district of a country, naturally leads to the inquiry, whether or not they are brought about by similar causes. Saussure devoted a good deal of attention to this subject when he was in Switzerland; and so did Mr. Coxe, who makes the following remarks:—

> The same causes which generate goîtres *probably* operate in the case of idiots; for wherever goîtres prevail to a considerable degree, idiots invariably abound; such is the nice and inexplicable connexion between our bodies and our minds, that the one ever sympathizes with the other; and it is by no means an ill-grounded conjecture, that the same causes which affect the body should also affect the mind; or, in other words, that the waters which create obstructions and goîtres, should also occasion mental imbecility. Although these idiots are frequently the children of goîtrous parents, and have usually those swellings themselves, yet they are sometimes the offspring even of healthy parents, whose other children are properly organized, and are themselves free from guttural excrescences. I observed several children, scarcely ten years old, with very large goîtres. These tumours, when they increase to a considerable magnitude, check respiration, and render those who are afflicted with them exceedingly indolent and languid. Some persons have, in opposition to the opinions that I have ventured to advance, supposed that the small glandular swellings, which are common in many other parts, and those which are more particularly observed in the Valais and other parts of Switzerland, do not proceed from the same causes. But sufficient reasons have not been assigned for this opinion. During my expedition through the Valais and other parts of Switzerland, I saw goîtres varying in size from that of a walnut to that of a peck loaf.

Coxe here alludes to the supposed agency of *water* in producing these diseases. But the truth is, that we do not know what are the causes. Goître has been by many persons attributed to the use of snow-water as drink; but the disease occurs where there is no snow, as in Sumatra, and several parts of South America; and, what is more conclusive evidence, the Swiss who drink snow-water, are free from the disease, while those who use hard spring-water are most afflicted with it. Captain Franklin remarked in one of his voyages to the north, that several were attacked with the disease who drank river-water; while those who drank snow-water escaped. It has been observed in Geneva, that those who drank the hardest spring-water were most liable to goître. The prevalence of the disease in one particular district of Switzerland, has been ascribed by Mr. Bally, to the use of spring-water impregnated with calcareous and some other mineral substances; and that those who abstain from the use of this water are free both from goître and idiocy.

The goître occurs principally in Switzerland, Tyrol, Savoy, South America, and Derbyshire; but the disease does not exhibit the same features in all those places. For instance, in Derbyshire it, in most cases, only attacks females, and generally when they are approaching towards womanhood; while in Switzerland, men are likewise very often afflicted with it. Many have supposed that it has an intimate connexion with poverty and bad food, the rich being comparatively free from it; but, however that may be, it seems clear that the disease prevails most in low, moist, marshy, and warm valleys; for the inhabitants of elevated or dry situations, even in the neighbourhood of such valleys, are tolerably free from it.

With regard to *crétins*, they are not so widely spread as *goîtres*, being chiefly confined to the villages and hamlets of the Lower Valais, among the Alps, and of the Val d'Aosta, in Piedmont. At the latter

place the women wear black or white caps, fastened under the chin, for the purpose of partially concealing the goîtres which most of them have; and many of them are likewise idiots. The crétins seem to prevail only on the immediate borders, both Italian and Swiss, of the Alps, and to be rare in the more northern parts of Switzerland. As much diversity of opinion seems to prevail respecting the cause of this affliction, as of goîtres. Some attribute it to the water which is drunk; and others to the stagnation of the atmosphere; for it is most prevalent in low, marshy spots, at the bottom of valleys surrounded by high mountains, where the fresh air does not circulate freely, and where the reflected rays of the sun are very powerful in summer: of this opinion was Saussure. We may also believe that poor diet, filth, laziness, and ignorance, contribute to the effect; for it has been observed that the number of crétins has decreased in the Valais, since some of the marshes have been dried up, improved domestic habits observed, and the use of purer water to drink.

Imbecility of mind is the most difficult of all diseases to cure; but goître bids fair to yield to the advancement of scientific discovery. Iodine has been found a most valuable remedy for goître. Iodine is one of the ingredients in *sea-weed*, and also in *sponge*; and as burnt sponge was one of the remedies employed for goître, it occurred to a learned physician at Geneva, that it might possibly be by virtue of the Iodine which it contained, that sponge was so valuable. Actuated by this idea, he administered iodine by itself, and met with the most happy results. The remedy was then introduced into England, and Dr. Manson, of Nottingham, states, that out of a hundred and twenty cases treated by him, seventy-nine were cured, and eleven greatly relieved. Other physicians have tried the same means and have met with similar results, both in England and in other countries. Iodine requires a great deal of care in the application, as it is liable to produce a high degree of irritation in the system, especially in persons of a weak habit of body. Sometimes it has been found advantageous to combine the external with the internal application of this valuable medicine; but much precaution is necessary in so doing. On other occasions no application whatever of iodine has been found successful; so that the medical practitioner was reduced to the dangerous necessity of cutting out the tumour.

RECREATIONS IN NATURAL PHILOSOPHY.

No. XV.

On the Elasticity of Liquids.

It was usual at one period of science to distinguish between airs and liquids by means of the terms *elastic* and *non-elastic*; but more rigid inquiry has proved that elasticity is a property common to matter generally, and that although airs are far more perfectly and extensively elastic than liquids, yet the latter bodies are by no means devoid of elasticity: although enormous pressure and very delicate instrumental aid are necessary to estimate the amount.

At the end of the seventeenth century, the academicians del Cimento at Florence, conducted a variety of experiments to ascertain the amount of diminution undergone by liquids during compression. One of their experiments consisted in filling a hollow sphere of thin gold with water, and carefully closing the aperture. Now the sphere has a larger internal capacity than any other geometrical figure of the same superficial dimensions: if, therefore, a hollow sphere be compressed and its shape altered, it cannot contain so much as it did before the compression. The Florentines, therefore, on compressing their golden sphere full of water, supposed that, if the metal was not ruptured or stretched, but changed its form and still retained the water within it, such water would be in a compressed state: they found, however, that the water oozed through the pores of the gold, and stood in drops on its surface. This experiment was supposed to prove the incompressibility of water; but, in fact, it only proved that water may be forced through the pores of gold more easily than it can be compressed. The Florentines believed from their experiments that if water were compressible, "its compressibility could not be proved by experiment."

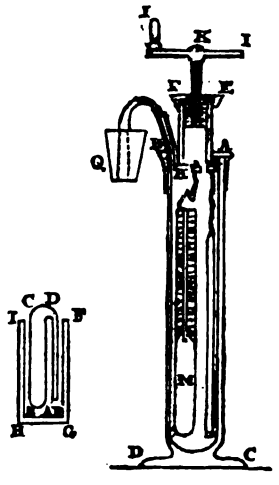
In 1761 Canton attempted to prove the compressibility of water and of other liquids by a very simple experiment. This apparatus consisted of a narrow tube of glass with a large bulb at the end like a thermometer. The stem was divided into equal parts, each part having a known relation to the capacity of the bulb. On filling the bulb and part of the stem with pure water, he applied heat, so as to make the water occupy the whole of the stem, which he closed at the top by melting the glass. When the water cooled, it contracted to its former limit, and left a vacuum above it. In breaking off the point of the tube, Canton remarked a very sensible depression of the level of the water, which he attributed to its contraction by the pressure of the air to which it was now exposed. But, in an experiment of this kind, the interior surface of the tube expands, and its capacity augments, the moment the air (and its consequent pressure) is introduced; so that it becomes necessary to know the amount of this expansion in order to be well-assured of the compressibility of the water.

The pressure of the air has so great an influence in preserving the form, the capacity, and general stability of all terrestrial objects, that we only become sensible of the inestimable value of this property of the atmosphere after a course of experimental study. That our vessels containing liquids, as well as the animal vessels containing the vital current, are of a certain capacity under atmospheric pressure; and that, this being removed externally, they are greatly altered, is a subject which admits of demonstration. If we place the bulb and narrow stem of water which Canton employed, under the receiver of an air-pump, the liquid descends in the stem as we remove the air from around the bulb, proving that the vessel enlarges as we relieve it externally from atmospheric pressure. If the point of the sealed tube (which ought to project through the top of the receiver) be now broken off, the level descends yet lower; this is partly due to the expansion of the bulb from the atmospheric pressure acting on the interior. If we now re-admit the air into the receiver, the liquid rises in the stem in consequence of the contraction of bulb by the pressure of the air upon its outer surface.

But there is a more satisfactory method of showing the compressibility of liquids. In 1819, Mr. Perkins contrived an instrument which he called a *piesometer*, or *measurer of pressure*. It consists of a metallic tube closed at one end, and to the other end is fitted a metallic plug, with a rod moving in it through an air-tight and water-tight hole. On this rod a metal spring was fixed; over this was screwed a cap to protect the rod, the cap being drilled with holes to let in the water. This apparatus being sunk by means of leaden weights to the depth of five hundred fathoms (equal to three thousand feet) in the sea, it was found that the ring, when the instrument was

brought up, stood eight inches high on the rod. The rod, therefore, had been driven eight inches into the cylinder by a pressure of about fifteen hundred pounds, which compressed the water about one-twenty-seventh part of its bulk.

In 1823, M. Œrsted prepared an apparatus for estimating the compressibility of water, a section of which is given in the accompanying figure. It consists of a cylinder of glass, A B C D, made extremely strong, with a smaller cylinder fitted into it, which is made of metal, and is closed at the top by a stout copper cap F E, in which a piston works by means of a screw K. M is the vessel destined to receive the liquid, whose compressibility we wish to estimate: a capillary tube is attached to this vessel, behind which is a scale of equal parts. By the side of M is a tube suspended in the cylinder open at bottom and containing air, the contraction of which air shows the amount of compressing force which is being exerted. Water is introduced into the cylinder A B C D; the vessel M is inserted, and the air-tube is suspended vertically, being so kept by being loaded with a little leaden weight at the bottom. The metal cylinder, and the piston lowered to A B, which had been removed to admit the water into the glass cylinder, are now fastened on at A B. The piston K is then drawn up, by which means a vacuum is created within A B F E; the water ascends the siphon-tube from a source of water Q, and enters the cylinder at B H. When the upper cylinder is also full of water, pressure is transmitted to the liquid in M by lowering the piston K, so as to exert a powerful compressing force upon the water in the cylinder, which cannot escape at H back into Q, because a valve is placed at H, opening inwards only; nor can the piston start up because it works with a screw in F E: the pressure therefore exerted upon the water in the cylinder is transmitted to the liquid in M, and is estimated by the descent of the air in the capillary tube above M. In this way the compressibility, and consequently the elasticity, of many liquids has been estimated.



It should be observed that at the upper part of the vessel M, and likewise of the air-tube, are strings with corks attached, for the purpose of easily drawing them up out of the water. At the top of the capillary tube, above M, is a glass cap, not shown in the figure, loaded at bottom to keep it inverted in the water. Being thus inverted, it is full of air, and prevents the water from entering from the cylinder into the capillary tube; or, if it should nevertheless be forced in by extreme pressure, the column of air in the capillary tube not being able to escape, remains constant between the water without and the water within the vessel M. This separation is visible from without.

Now the divisions on the scale above M afford fractional parts of the contents of the whole vessel M; and the proportion which each division bears to the contents of M, is found by weighing the quantity of mercury which M will hold, and the quantity which a division on the scale will hold. Whatever fraction *the one weight* is of the other, the same relation subsists between a division on the scale to the contents of M. A depression of the water in the capillary tube by the air above it shows a certain compression, which is estimated when the contents of M are known.

The pressure is carried from the piston K, through the whole of the cylinder A B C D, and thence through the capillary tube into M; so that the pressure within and without the vessel M is the same. Water has thus been compressed to the amount of 46$\frac{1}{2}$'s millionths of its bulk, for a pressure amounting to fifteen pounds on a square-inch of surface.

The arrangement of M may be varied, as in the other figure, where the vessel B C D, has a capillary tube, turning downwards, and open at A E. This vessel is contained within another, I F H G, and both are enclosed in the cylinder A B C D, which in this case is made of metal, in order to carry on a higher pressure, which Œrsted wished to do, in trying a very high pressure, in the compressibility of air. But, as the vessel A B C D was thus no longer transparent, it was necessary to contrive some other method, by which the pressure at K, and the compression of the air, might be estimated, when the apparatus F I H G was taken out of the water.

In order to estimate the pressure from K, Œrsted used, instead of the tube at the right of M, a smaller tube, expanded at its closed extremity into a bulb, and having a short column of mercury in it, on whose surface was an index, with a hair-spring pressing it against the side of the tube; so that the index stuck at the extreme point to which the mercury raised it, when the latter had receded.

The vessel I H G F contains mercury. The only opening of the vessel A B C D is at E. This latter vessel contains the air for experiment; and these two vessels are thus sunk into the large cylinder, A B C D. The pressure being then applied, the mercury is driven up the tube E D and into C B, where it lodges at B. When the pressure ceases, only that portion of the mercury in the tube A D will return; and the volume of that contained in B C, being added to that which was in the tube, will equal the volume by which the air was diminished at the greatest pressure. Œrsted thus compressed air into one sixty-fifth of its bulk.

We have thought fit thus to describe this elaborate apparatus, in order to show the young student how difficult it is to estimate with precision the elasticity of liquids in particular. That liquids are elastic he may assure himself by a very simple experiment. Into a shallow box containing a small quantity of lycopodium, or finely-powdered chalk, let a little water be poured. The water can be thus made to roll about, without wetting the box. If the box be suddenly inclined, the drops, on striking against the side, will rebound; which they would not do if water were incompressible, and consequently non-elastic.

In playing at "duck and drake," we have another example of the elasticity of water. A flat stone is thrown nearly horizontally against the surface of water. The stone bounds and rebounds several times, which it would not do, unless the water were elastic. When a cannon-ball is fired from a ship, the gun being slightly inclined towards the water, the ball rebounds from the water in a similar manner.

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THE COAST OF NORMANDY, IN FRANCE.

NEEDLES AT ETRETAT, NORMANDY.

We propose, on the present occasion, to conduct our readers in a ramble along that portion of the coast of Normandy in France, which is included between the rivers Somme and Seine, and take a slight glance at the principal objects which are presented to the traveller along that route.

The first place which we have to mention is *Abbeville**, a town situated on the river Somme, the eastern boundary of the extent of coast which we have selected. Abbeville is the chief town in an *arrondissement*, or district of the same name. It is strongly fortified, and the country around it can be easily inundated. It is built in the old-fashioned style, has several bridges, four squares, fourteen churches, one of them, St. Wolfram's, very antique and curious, about 3700 houses, and 19,000 inhabitants. It has long been the seat of the woollen manufacture; besides which there are manufactories for linen, cotton, soap, leather, and twine. The river is navigable by the help of the tides; and by it oil, linseed, and hemp, are exported. Mr. Ritchie observes:—

Like many other French towns, Abbeville is destitute even of the common guide-books, which at least furnish the traveller with a catalogue of what is to be seen. While talking on this subject with a bookseller, he gave me to understand, that such a work had been universally and urgently demanded by strangers for many years past, but—and he shrugged his shoulders. We did not inquire into the *but*; but it too evidently meant that nobody had the spirit to do what everybody wanted, and would have paid handsomely for having done.

The old cathedral at Abbeville is very fine. The front is rich in Gothic ornaments, and the whole appearance of the edifice would be venerable and imposing, were it not for the mean and paltry dwellings which obstruct and offend the view, and come even in contact with the building itself. This complaint, however, is not peculiar to the cathedral of Abbeville. The interior is divided into three great aisles, each with an altar at the further end, and chapels at the sides. Abbeville is a tolerably clean little town; but the people seem accustomed to little more than a passing glimpse of strangers, on their way to or from Paris, and, to use the words of Mr. Ritchie, "take no pains to make themselves agreeable." There are many beautiful walks about Abbeville: the promenade on the ramparts is very fine, especially in the evenings of early Summer, when a full chorus of thousands of nightingales produces, in combination with the surrounding scenery, a charming effect, which the writer of this article has often experienced.

Returning down to the mouth of the Somme, (Abbeville being situated some little distance up that

* See also Vol. XI., p. 10.

river) and proceeding westwards, the next place worthy of notice is the town of *Eu*. This little town is well worth seeing; it has two churches, and an hospital for the sick, attended, as is usual, in France, by the nuns of charity, or *Hospitalières*. Eu was formerly a place of some note, arising from the great power which Normandy possessed about the time that William, one of its dukes, invaded England, and became, what we now call him, William the Conqueror. The counts of Eu distinguished themselves by their valour: first, by fighting with Duke William in England, then by joining the Crusades in Palestine.

The finest church in Eu, that of Nôtre Dame, is extremely large, and of beautiful Gothic architecture. Near a side altar, dedicated to St. Laurent, stands a curious twisted column; it is remarkable that the capital of this column is the work of the thirteenth century, and the singular twisted shaft, with the base, that of the fifteenth. Mrs. Stothard says,—

We saw in this church a curious representation of Christ laid out; the figures carved in wood, and really well executed. Whilst we were looking at it, a poor woman brought her candle, lighted it, and placed it up before the image; she then threw some fine roses upon the figure of Christ, knelt down, and with closed eyes and clasped hands, appeared absorbed in devotion. Presently she arose, and after kissing the hands and feet of the image, quitted the altar.

In another church which the same lady visited at Eu, she saw an image of the virgin hanging above the altar. It was dressed out with peacock's feathers, dirty flowers, yellow petticoats, and a white veil.

We now pass on to *Dieppe**, the next sea-port town. It contains about three thousand houses and twenty thousand inhabitants, chiefly dependent on the commerce of the port. Being the best inlet for Paris, it is the great depôt for colonial goods, and the resort of foreign ships, especially of those from America. There are many manufactures, but principally of the kind connected with the equipment of ships; and besides these, some sugar and salt refineries, and a large number of workers in ivory ornaments: the stranger is surprised at the number of large shops devoted to the sale of these articles. From this port William the Conqueror sailed with his forces for England. The little harbour is frequently studded with small fishing vessels. Mr. Ritchie observes,—

If the wind, as you enter the port, is tolerably favourable for leaving it, you will probably meet with a long line of these fishing craft driving out of the embouchure into the sea. The men lie lazily along the beams, dressed in red caps, blue or brown jackets, and little petticoats resembling loose small-clothes; while their vessel is dragged along by the women, singing in chorus, and keeping time with head and foot as they perform a kind of running march to the end of the pier. Here they throw the rope off their shoulders with a shrill shout, and stand for an instant to gaze after their husbands and brothers. These no sooner feel that they are fairly launched, than they start from their posture of lordly ease. It is then their turn. They fling out their immense mainsail to the wind, seize the trembling helm, and the little vessel, apparently empty even of ballast, goes dancing forth upon the waves.

If any of our readers are surprised at hearing that females are employed in the manner just described, we may remind them that French women of the lower class are employed in laborious occupations which an Englishman would not permit to his wife, sister, or daughter: we mention the fact, without professing to be able to account for it; but we have often seen in France female water-carriers, female ostlers, and female barbers. The latter *shave well* for a couple of sous, and the female ostlers may be seen about the ponderous *diligence* taking off the wheels and greasing the axles, while the men stand gazing idly on. In the middle classes, too, female clerks and accountants are by no means uncommon.

The women of Dieppe are strongly-made, clear-complexioned, and tolerably handsome. The same weather which turns the cheeks of the men brown, turns theirs red; and in their blue or red petticoats, and caps fitted close to the head, they form rather pleasing specimens of fishermen's wives: nay, they are not only fishermen's wives, but fisherwomen. The sea is the men's province, and the land theirs. When the tide is ebbing, they may be seen in ranks, with bare feet and legs, pursuing steadily the retreating waves, and filling their baskets with shell-fish.

The streets of Dieppe are not accommodated for foot-passengers in the same manner as ours, but are paved all over alike, with common round stones; men, horses, and carts, press along them, and mingle together in confusion. The shops in the streets have no fronts at all, with the exception of a very few; they are quite open; the goods exposed for sale are placed on counters and suspended around the interior. The same lively writer before quoted, thus pictures a *table d'hôte* at Dieppe:—

My next neighbour at dinner was a French gentleman, of a most monstrous size, whose naturally fierce look was considerably augmented by a large pair of well-curled mustachios: he seemed a mixture of all kinds, and yet was neither decidedly bear, monkey, nor man. He wore, suspended by a little red riband, an ornamented cross; a kind of order as common in France as the title of esquire on the back of a letter in England, and often applied with as little just pretension. On the opposite side, sat an old beau of sixty, dressed in a sky-blue coat; his hands were scented, and his fingers covered with French-paste rings. Next to him a pretty lively woman, who conversed so familiarly with all the gentlemen, that I was greatly surprised to find she was an entire stranger at the board. Conversation seemed as much the object of attention as their repast; the whole party spoke together, and made a most unceasing voluble noise.

Proceeding a little further westward along the coast, we arrive at the sea-port town of *Fécamp*, which is situated at the mouth of the river Seine. It has a good tide-harbour, and contains rather more than a thousand houses. The inhabitants amount to about eight thousand, many of whom are employed in the herring and mackerel fisheries, some in ship-building, and others in the manufacture of sail-cloth, flannels, counterpanes, and tent-cloth.

Mr. Ritchie arrived at Fécamp on a Sunday, and describes the scene which presented itself to his eyes. In strolling along the wharf, the first group of persons he met consisted of elderly men, engaged in a game somewhat resembling the *skittles* of an English village; there was another group of younger men, and a third of children, all busily battering away at the same amusement. Further on there was a group of old women; then appeared the pride of the place, the maidens; then the girlhood; then the tottering infancy, all skittling, skittling, skittling. The short stick which is thrown from the hand, was adapted, in point of size and weight, to the age of the player; and every one, from the oldest to the youngest, was furnished with an instrument of the kind, his own property. It was evident, therefore, that this was the standing game of the place. This was not in the town of Fécamp, but at St. Valery, a short distance from it.

To the westward of Fécamp there are a number of little villages, exhibiting more or less of comfort and ease, and the inhabitants of many of which are employed in fishing. They are in a much better condition than formerly, for it is said that in the sixteenth century the Norman peasants were so poor that they lived almost wholly on oats, like the Scotch highlanders of the present day: the Bretons clothed

* See also Vol. IX., p. 106.

themselves in skins instead of cloth; in Perigaud and Limousin bread was a rarity, the common food being roots and greens; in the Bordelais and Beaune they were satisfied with millet-cakes; and in Lorrain, Forez, and Auvergne, they shared the habitations of their domestic animals, and regaled themselves throughout the year with salted goats' flesh and buck-wheat porridge.

In proceeding from Fécamp to Havre by land, the distance is but small; but in going round the coast by sea, it is considerable; and it is in this coasting that the voyager meets with those remarkable rocks called the *Needles of Etretât*, of which our frontispiece is a representation. They are situated near Cape d'Autifer, a bold headland stretching out into the sea. The coast is guarded not only by lofty cliffs, but by sand-banks, the formation of which, and of the less moveable masses which the French call *Galet*, is evidently caused by the action of the tide upon the cliffs; and the point of land called Cape d'Autifer, dividing the current of the channel, sends one half of these sandy deposits towards the Seine, and scatters the remainder upon the shores of Picardy.

We can very easily account, therefore, (as Mr. Ritchie observes,) for the constant danger in which the harbour of Fécamp stands of being filled up with sand; but it is less easy to imagine how the sea, at the very moment when it is grinding the rocks to powder, should be in the act of retiring to its depths, and abandoning a part of its empire to the land. This can only be explained, we should think, by supposing that it gradually dams itself in by the spoils it wrests from the solid earth, and that therefore the shore at the base of the cliff of Fécamp is considerably higher than it was in former days.

The needles of Etretât present evidence of the violent action of the sea, for the holes through them (which we may, perhaps, be allowed to call the *eyes* of the needles) have in all probability been formed by the constant abrading force of the waves, acting probably on some portions of their substance which are softer than others. Being situated at the bend where the English channel shapes its course towards the south-west, they are much exposed to the violence of the waves, and form a dangerous obstacle to ships which approach too near them.

A few miles further, we arrive at the end of our journey, by entering the mouth of the Seine, where is situated the important town of *Havre de Grace* (the Haven of Grace.) It contains a population of upwards of thirty thousand inhabitants, who carry on manufactures of earthenware, soap, tobacco, starch, vitriol, pitch, cordage, paper, cards, &c., besides several breweries, refineries, and ship-building yards. The wives of the humbler classes are much engaged in making lace.

The town consists of two parts, the *old quarter* and the *new quarter*, in the former of which the houses are ill-built, but in the latter they are regular and handsome; the streets are neat, well-watered, and well-lighted. There is an arsenal, a custom-house, a town-hall, an exchange, two churches, and a theatre; there is also a handsome square, planted with trees, and forming a public walk. At Cape la Hève, a headland about one hundred and thirty yards high, at the mouth of the Seine, two miles and a half west of the town, are two handsome light-houses, about fifty feet high; and there is also a brilliant harbour-light at the entrance to the port.

There is a subordinate court of justice, and a court of commercial disputes, in Havre; also a public library of fifteen thousand volumes, and other literary establishments. But the principal importance of the place is derived from its commerce, as it is a port where nearly all foreign productions destined for the use of Paris are landed; the imports amounting to ten millions sterling per annum.

We must now take our leave of the Norman coast. We may, at some future period, describe other towns bordering to the westward of those which have occupied the present papers.

TO THE WEATHERCOCK.

The dawn has broke, the morn is up, another day begun,
And there thy poised and gilded spear is flashing in the sun,
Upon that steep and lofty tower where thou thy watch has kept,
A true and faithful sentinel, while all around thee slept.

For years, upon thee there has poured the summer's noonday heat,
And through the long, dark, starless night, the winter storms have beat;
But yet thy duty has been done, by day and night the same;
Still thou hast watched and met the storm, whichever way it came.

No chilling blast in wrath has swept along the distant heaven,
But thou hast watch upon it kept, and instant warning given;
And when midsummer's sultry beams oppress all living things,
Thou dost foretell each breeze that comes with health upon its wings.

How oft I've seen, at early dawn, or twilight's quiet hour,
The swallows, in their joyous glee, come darting round thy tower,
As if, with thee, to hail the sun, and catch his earliest light,
And offer ye the morn's salute, or bid ye both—good night.

And when around thee, or above, no breath of air has stirred,
Thou seem'dst to watch the circling flight of each free, happy bird;
Till, after twittering round thy head, in many a mazy track,
The whole delighted company have settled on thy back.

Then, if perchance amid their mirth, a gentle breeze has sprung,
And prompt to mark its first approach, thy eager form has swung,
I've thought I almost heard thee say, as far aloft they flew,
'Now all away!—here ends our play, for I have work to do!'

Men slander thee, my honest friend, and call thee, in their pride,
An emblem of their fickleness, thou ever-faithful guide!
Each weak, unstable human mind a 'weathercock' they call;
And thus, unthinkingly, mankind abuse thee, one and all.

They have no right to make thy name a by-word for their deeds:
They change their friends, their principles, their fashions, and their creeds;
While thou hast ne'er, like them, been known thus causelessly to range,
But when thou *changest sides*, canst give good reason for the change.

Thou, like some lofty soul, whose course the thoughtless oft condemn,
Art touched by many airs from heaven which never breathe on them;
And moved by many impulses which they do never know,
Who, 'round their earth-bound circles, plod the dusty paths below.

Through one more dark and cheerless night thou well hast kept thy trust,
And now in glory o'er thy head the morning light has burst:
And unto earth's true watcher, thus, when his dark hours have passed,
Will come 'the day-spring from on high,' to cheer his path at last.

Bright symbol of *fidelity*, still may I think of thee;
And may the lesson thou dost teach, be never lost on me;
But still, in sunshine or in storm, whatever task is mine,
May I be faithful to my trust, as thou hast been to thine.

A. G. Greene.

Whoever is not persuaded by reason, will not be convinced by authority.—Feyjoo.

ELECTRICITY.

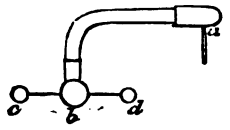
No. XI.

ELECTROMETERS.

IN operating with accumulated electricity, we ought to be able to estimate its effects; and on some occasions it is also desirable that we should measure the quantity we employ.

Let us describe one or two of the instruments commonly used for the above-mentioned purpose, and which are chiefly applicable to cases of merely popular illustration; and then we will notice some recent arrangements by which the quantity of electricity may be ascertained, and its force regulated, with the utmost accuracy and uniformity.

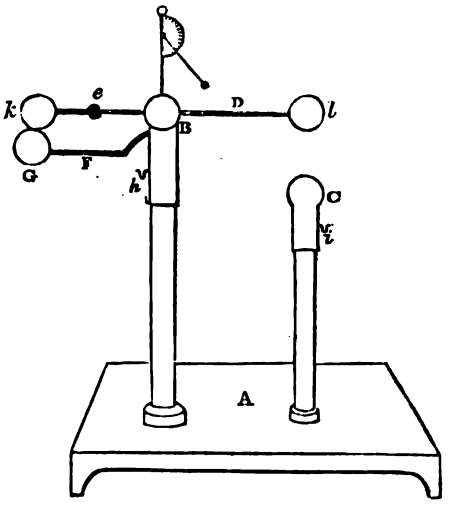
The annexed figure represents *Lane's Discharging Electrometer*, which consists of a rod of glass about nine inches in length, bent at a right angle and terminating as at *a* in a brass pin, by means of which the instrument is fixed to the conductor of the machine. *b* is a brass ball, through the centre of which there passes a sliding rod with balls at each of its extremities. The action of this electrometer depends on the insulating properties of air. The manner of using it is as follows:—being attached to the conductor, as already described, the *outside* of the jar (or battery) is made to communicate with *c*, whilst the *inside* is connected with the machine in the usual way. The force of the charge is regulated by the distance at which *d* is placed from the conductor; and which, of course, is greater in proportion as that distance is increased. All things being arranged as just mentioned, we proceed to charge the jar (or battery), and when the accumulated electricity has acquired sufficient intensity to penetrate the air interposed between *d* and the nearest part of the conductor, a spontaneous discharge will ensue, and the electrical equilibrium be restored.



The instrument we have been describing is sometimes made of such a form as that it may be connected with a jar. It is then a convenient apparatus for communicating shocks in medical electricity.

It must be apparent, however, that the above electrometer affords, at the best, and whatever be its form, only a very imperfect means of estimating the effects of an electrical discharge. We have already shown that *quantity* and *intensity* of electricity are distinct conditions, although necessarily dependent in some respects on each other; the former referring to the actual amount of disturbance irrespective of the extent of surface over which it is distributed—the latter to the force exerted by the disturbed elements to regain their former state of repose. Now since the action of the instrument before us is determined solely by the intensity of the charge, and air, by the admixture of floating particles of dust, or of more than an ordinary proportion of moisture, being a less perfect insulator at one time than at another, it is obvious that with the most careful adjustment it is impossible to ensure, at different times, and under altered circumstances, exactly similar results. But notwithstanding these and some other disadvantages which it is not worth while to enumerate, this form of electrometer is very useful; and especially when the operator is engaged in a series of popular experiments, as it enables him to discharge a jar or battery without the aid of an assistant to turn the machine.

Here is an instrument more generally useful, as it is also more accurate in its indications than the one just described. It is called *Cuthbertson's Balance Electrometer*. Let us first explain its various parts, and then its principle and mode of action. A is a mahogany stand, say fourteen inches long by six



wide, into which are fixed two strong glass pillars B C, the former of which must be about three inches longer than the other. To the top of each of these pillars are fitted spherical brass caps; a part of that on the longest pillar being moveable. D is a brass rod terminating in balls (*k l*) of the same metal and of equal sizes. This rod is supported at its centre by knife-edges, allowing it to move freely in a vertical plane in the same manner as a scale-beam. On one of the arms of D is a small sliding weight *e*, which gives a greater preponderance to that arm of the balance in proportion to its distance from the point of suspension. The space over which this weight moves is graduated, each division being equivalent to one grain. F is a bent brass rod fixed at one end to the cap on B, and so adjusted that by means of the ball G it supports D in its horizontal position. The small holes *h i* are for connecting the instrument with the opposite coatings of a jar or battery

The action of this electrometer depends on the well-known law that bodies, similarly electrified, repel, and those, dissimilarly electrified, attract, each other. Its principle will, however, be easily understood by attending to the method of using it.

We will suppose that a charge of electricity of any given intensity is required from a battery, which is to be measured by the instrument now under consideration. Before we begin to charge the battery, the cap on the pillar B must be connected with the inside coatings of the jars, and this must be done (by means of a chain or wire) in such a manner that no part of the accumulated electricity be lost. The cap on the pillar C must communicate with the outsides of the jars, and at some convenient point in this latter part of the circuit must be placed the substance through which it is intended that the electrical charge should be transmitted*. These arrangements being completed, the weight *e* must next be adjusted, so that the charge may be sufficiently strong for the purpose required, and yet not too strong, as thereby to endanger any of the jars, which can, of course, be known only by previous experiment. As the balance-electrometer gives no indication of the progress of the charge until near its completion, and as the accidental fracture of a jar, the state of the atmosphere, or some unperceived defect in the apparatus may occasion delay and disappointment, it is best to em-

* See a description of the *Universal Discharger*, Vol. XIV. p. 116.

ploy *Henley's Quadrant Electrometer** in conjunction with *Cuthbertson's*; and it may be fixed to the conductor of the machine or to the cap on B as shown in the figure.

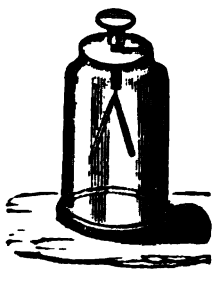
We may now proceed to work the machine, when the electricity excited by it will diffuse itself over those parts of the apparatus in metallic contact, namely the conductor, the battery, and the parts of the electrometer attached to the pillar B. If the arms of the balance had been adjusted *equally*, one or two turns of the machine would have caused the balls *k* G to separate, and the balls *l* C to unite; the result of mutual attraction and repulsion exhibited by bodies when in similar or in opposite states of electrical excitation. But the weight *e*, by giving a preponderance to that arm of the balance to which it is attached, and greater in proportion as its distance from the centre of suspension is increased, renders it necessary that the electricity should be accumulated, until the repulsive action induced between *k* G is sufficient to overcome the resistance of the weight, (and which may be varied from one to sixty grains,) and when that is accomplished, the balls separate, *l* descending at the opposite end until it strikes C, and thus the discharge is effected. The balance, immediately resuming its former position, is ready to measure another charge, equal in intensity (all the arrangements remaining the same) to the preceding one; and this it will do with considerable exactness, until a new adjustment be made.

Some of the objections made to *Lane's* electrometer apply with equal force to *Cuthbertson's*, and particularly that in reference to its being a measurer of intensity, not of quantity.

The latter is, however, the more sensitive instrument of the two, it is extremely simple in its operation, not soon affected by atmospherical changes, and so long as the surface of coated glass, with which it is connected, remains constant, it regulates the charge with a degree of accuracy quite sufficient for all practical purposes.

As we have not left ourselves space for describing, as we intended, some recently-invented instruments for measuring electricity, and which must, therefore, be the subject for a future paper, we shall conclude the present one with an account of a very useful electrometer, which is used, not for determining the quantity or intensity, but the kind (or state,) of electrical excitation in bodies.

The instrument here referred to, as represented in the accompanying figure, is *Bennet's Gold-leaf Electrometer*. It consists of a small glass jar, the cover of which is penetrated by a wire, supporting externally a metallic cap; and to the other end of it is attached two narrow slips of gold-leaf. By these simple means we can detect the existence, and determine the precise character of electrical excitations which occur in bodies under a great variety of circumstances, and which are induced by causes so comparatively unimportant, that they never attract the attention of ordinary observers.



When an excited body approaches the cap of the instrument, the gold-leaves instantly diverge, (as shown in the figure,) and if the body so brought into proximity with it, be very highly excited, the leaves will be torn by the sudden shock. Hence it must be remembered that the electrometer before us is intended only for assisting in the investigation of very feeble currents of electricity.

To ascertain the character, that is, the kind (or state,) of electrical excitation we have to deal with, we proceed as follows:—When the gold-leaves are in a state of divergence, and we bring near the cap of the instrument a stick of excited sealing-wax, if the divergence continue or increase, it is a proof that the electricity is *negative:* if the leaves collapse, it is *positive.* By reversing the experiment we may decide the question still more satisfactorily;—thus, if we again cause the divergence of the leaves, and approach them with an excited glass-rod, if the character of the electricity be negative, the leaves will collapse,—if positive, the divergence will continue.

Some precautions must be observed in applying the before-mentioned tests, otherwise they may lead to erroneous conclusions. For instance;—in some cases, where the state of the electrometer is to be examined, it is necessary to approach it very gradually with the excited wax, or glass, and to watch attentively the first movements of the gold-leaves. Care must also be taken that the hand, or any other part of the operator, do not interfere with the experiment. Equally important is it that the excited bodies, that is, the one whose electricity we are examining, the electrometer, and the test we apply to it (wax or glass), should be kept at a proper distance from each other.

* Vol. XIII., p. 229.

POVERTY and wealth have different temptations, but they are equally strong. The rich are tempted to pride and insolence: the poor to jealousy and envy. The envious and discontented poor invariably become haughty and overbearing when rich; for selfishness is equally at the bottom of these opposite evils. Indeed, it is at the bottom of all manner of evils.—MRS. CHILD.

TRUE humanity consists not in a squeamish ear; it consists not in starting or shrinking at tales of misery, but in a disposition of heart to relieve it. True humanity appertains rather to the mind than to the nerves, and prompts men to use real and active endeavours to execute the actions which it suggests.—CHARLES JAMES FOX.

IMAGINE a long tract of woodland spreading over a varied but not deeply indented surface, and covered with short broad oaks, thick hollies, and ragged thorns. On the hills and the declivities that sweep gently from them, are thickets of copse-wood, impervious in most places to the sun, and traversed only by the smaller beasts of prey. * * * * Conceive, in one of these sylvan glades, a few rude huts, constructed of the branches and bark of trees, and seeming to be merely an outpost of the woodland, from which their materials have been taken; conceive the inhabitants of them, half covered with skins, and with their own thickly matted hair, to be basking in the broad sunshine, and gazing idly on the half-tamed herds which supply them with their food and clothing: and you have a picture of pastoral life, as it once existed in the uplands of ancient Britain.

What, then, before the final departure of the Romans from the island, and when their own empire was falling rapidly into decay, was the change which had gradually, but inevitably, followed? The wild herds of cattle, and their half-tamed owners, the deep forest and its savage hunters, the morass, with its scarcely human inhabitants, had been driven backward from public notice, or insensibly absorbed in the gradual increase of civilization. Instead of them appeared the populous city and the cultivated landscape, the toil of labour, and the discoveries of science, the splendour of opulence, and the debasement of pauperism, and a national character, which, still retaining its original fierceness and independence, and sometimes exalting them to the highest degrees of gallantry and self-devotion, had united and blended with them much of the knowledge and the refinements of their conquerors.—CARDWELL.

ENGLAND IN THE OLDEN TIME.
No. VII.

THERE is no pastime whatever which has existed more uninterruptedly among the better classes of English society, for several centuries, than *Hunting*. It is, allowing for accidents, one of the most healthy exercises in which a man may be engaged, and has a strong vein of excitement attached to it. Much diversity of opinion exists, as to whether hunting is, or is not, a cruel and improper sport. Persons will naturally argue according to the strength of their inclination for the sport. A sedentary student, quite removed from the bustle and enthusiasm attendant on a fox-chase, has time to ponder on the moral nature of the employment; while a country gentleman, to whom a fox-chase is as one of the sinews of life, never for a moment entertains the idea that his favourite sport is open to objection. The writer of this article being no sportsman, might, if he consulted his individual opinion, possibly designate hunting a cruel sport; but he cannot conceal from himself, that very many persons of amiable and humane dispositions, adopt sporting as one of their modes of recreation, when resident in the country. Instead, therefore, of expressing our own personal opinions, we will quote the following passage, from an excellent article in the *Encyclopædia Britannica* :—

Our sensibilities towards the sufferings of animals are limited not only in wisdom, but in mercy, (for, increase our sensibilities, and who could live?); and let us not charge a sportsman with cruelty, because he is the destroyer of that part of the brute creation which it was evidently intended should be destroyed by some one. Sportsmen have existed, and must for ever exist, from necessity. They have extirpated some animals, and called out such as are serviceable to man, and submit to his will and government. Those that will submit are his friends—those that will not are his foes: and so it was intended to be, since the charge was given to Adam, and the subsequent commission to Noah. The sports of the field, indeed, as now followed, are generally allowed to have a tendency to improve and promote a free and generous conduct, as well as that manly spirit which is the very reverse of cruelty; and in the harmless exercise of our imagination, looking at that law of nature which enjoins the destruction of one animal for the good of another, so far from passing a hard sentence on the sportsman, we think, with the poet, that

His life is pure who wears no fouler stain.

In the present article we do not profess to give a treatise on hunting, but a few notices of it in connexion with England in the Olden Time.

The ancient Britons, like most other rude tribes, procured the greater part of their food by hunting: it is said that the inhabitants of the northern parts of the island, tilled no ground, but lived by the depredation which they committed in the southern districts, and by hunting. It was said by Strabo that the British dogs were highly esteemed on the continent, on account of their excellent qualities for hunting; and these qualities he appeared to think were natural to them, and not the effect of tutorage by their foreign masters. There is evidence that venison constituted the greater portion of the food of the Britons; and as they had in their possession such dogs as were naturally prone to the chase, there can be little doubt that hunting by the aid of dogs was a very favourite pastime, or rather employment, among them. Besides, they kept large herds of cattle, and flocks of sheep, both of which required protection from the wolves and other ferocious animals, that infested the woods and coverts, and must frequently have rendered hunting an act of absolute necessity. There appear to have been no restrictive laws respecting the killing of game in force in those days. Wild beasts, birds, *and fishes, seem* to have been the property of whoever could catch them, during the occupancy of Britain by the Romans.

But when the Saxons came over into England, and assumed authority, a change occurred in this respect. The northern nations were much more addicted to field-sports than the Romans; and the nobles wished to arrogate to themselves the privileges and the facilities for hunting. Ultimately it became a privilege solely vested in the crown, and no one could hunt without the king's permission. It then became one of the most famous exercises of the titled and wealthy, and excited great emulation. We are told by Asser, that Alfred the Great, before he was twelve years of age, was "a most expert and active hunter, and excelled in all the branches of that most noble art, to which he applied with incessant labour, and amazing success."

When Athelstane, the grandson of Alfred, had obtained a signal victory at Brunanburgh, over Constantine, king of Wales, he imposed upon him a yearly tribute of gold, silver, and cattle, to which was also added a certain number of "hawks, and sharp-scented dogs, fit for hunting of wild beasts." The next sovereign, Edgar, remitted the pecuniary payment, on condition of receiving annually the skins of three hundred wolves.

The remarks made respecting the Saxons will apply with almost the same force to the Danes, who succeeded them in supremacy in England. When Canute the Dane had become firmly seated on the English throne, he imposed several restrictions upon the pursuit of game, which were not only very severe, but seem to have been altogether unprecedented; which may be considered as amply showing his strong attachment to this pastime; for, in other respects, his edicts were distinguished by a mildness and consideration for the amusements of the people generally.

After a short period, in which the Saxons again reigned in England, came the time of the Norman conquest. But we may here remark that Strutt has given two curious engravings, representing boar and swine-hunting among the Saxons, taken from old manuscripts.

Under William the Conqueror, severe laws were enacted respecting hunting. The privilege of hunting in the royal forests was not only confined to the king and his favourites; but in order to make the hunting-ground more capacious, whole villages were depopulated, and places of worship overthrown, without the least regard being paid to the miseries of the suffering inhabitants, or the cause of religion. William appropriated, in this manner, the New Forest in Hampshire; and his son, Henry the First, did the same at Woodstock park, which he enclosed by a stone wall, seven miles in extent. "In our time," says John of Salisbury, a writer of the twelfth century, "hunting and hawking are esteemed the most honourable employments, and most excellent virtues by the nobility; and they think it the height of worldly felicity to spend the whole of their time in these diversions. Accordingly they prepare for them with more solicitude, expense, and parade, than they do for war, and pursue the wild beasts with greater fury than they do the enemies of their country. By constantly following this way of life, they lose much of their humanity, and become as savage, nearly, as the very brutes they hunt. Husbandmen, with their harmless herds and flocks, are driven from their well-cultivated fields, their meadows, and their pastures, that wild beasts may range in them without interruption." Then speaking to his countrymen, he says:—"If one of these great and merciless hunters shall pass by your

on, bring forth hastily all the refreshment you your house, or that you can readily buy or from your neighbours; that you may not be l in ruin, or even accused of treason!" Here picture of the state of society in the Anglo- ı times.

ıg the forest-laws of these periods, it was that all unqualified persons were subjected to ıvy fines, not only for hunting, but even for ng the game. If a gentleman, or an inferior killed a stag in the royal forests, he was d from his rank: if a curl, or husbandman, ted the same offence, he was reduced to and if a slave killed one, he suffered death. ates were appointed, in every county or shire, hese laws in execution, and under them were ed inferior officers, or gamekeepers, whose : it was to apprehend the offenders.

ıg the Norman period, the clergy used some- ɔ follow the pastime of hunting to a greater han was thought consistent with their charac- l a law was made, which prohibited any priest, clerk, not possessing a benefice to the yearly of ten pounds, from keeping a greyhound, ɔther dog for the purpose of hunting; neither ıey use ferrets, hayes, nets, hare-pipes, cords, engines, to take or destroy the deer, hares, or under the penalty of one year's imprisonment. ;her orders of the clergy were altogether ex- from the operation of this statute; as the ws of Canute gave them great privileges in ɔect.

ɔears as if wolf-hunting was encouraged at an riod, for the purpose of ridding the island : obnoxious animals. We have alluded to the f the treaty between Athelstane and the king s. In the reign of William the Conqueror, le Umfranville held the lordship of Riddles- Northumberland, on condition of defending t of the country from wolves. In the reign ard the Third, Thomas Engaine held lands at in Northamptonshire, on condition of hunting ves from the midland counties. There are ants of land dependent on similar conditions. other article we shall briefly notice the pro- hunting, from the time of Edward the Third modern periods.

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s is a sort of early old age; it teaches us a diffi- our earthly state, and inspires us with thoughts re, better than a thousand volumes of philosophers nes. It gives so warning a concussion to those our vanity, our strength and youth, that we think ing ourselves within, when there is so little de- upon our outworks. Youth, at the very best, is trayer of human life in a gentler and smoother than age: 'tis like a stream that nourishes a plant ank, and causes it to flourish and blossom to the t at the same time is undermining it at the root in

I reflect what an inconsiderable little atom every an is, with respect to the whole creation, methinks me to be concerned at the removal of such a trivial s I am. The morning after my exit, the sun will right as ever, the flowers will smell as sweet, the ɔring as green, the world will proceed in its old ɔople will laugh as heartily and marry as fast as they d to do. The memory of man (as it is elegantly l in the Book of Wisdom), passeth away as the ance of a guest that tarrieth but one day. There ns enough, in the fourth chapter of the same book, any young man contented with the prospect of "For honourable age is not that which standeth in time, or is measured by number of years. But s gray hair to man, and an unspotted life is old age. taken away speedily, lest wickedness should alter rstanding, or deceit beguile his soul."—POPE.

SAMUEL RICHARDSON.

SAMUEL RICHARDSON, a talented writer and an estimable man, was born in Derbyshire in 1689, to which county his father had retired from the business of a joiner, in London. In very early life he was characterized by his love of reading, and while a mere boy he displayed the uncommon qualities of a taste for letter-writing, and for female society. At the age of thirteen he was so much in the confidence of three young females, as to be employed by them in making draughts of letters to their several correspondents; and at this early period, such were his fidelity and discretion, that not one of them suspected him to be the writer for the others.

When it became necessary for him to go out into the world, he was apprenticed to a printer, whom he served with great credit for the full term of seven years, stealing from the hours allowed for rest and recreation, his opportunities for mental improvement. He then passed some years as compositor, corrector, and foreman in a printing-office; and ultimately established himself in business on his own account, in Fleet Street. His habits of diligence and accuracy, and his honourable dealing, soon gained him employers and friends; and the superiority of his attainments to those of the generality of printers, caused him to be applied to by booksellers for making indexes, and writing prefaces and dedications. As his business increased, he thought himself in a condition to marry, and he accordingly married the daughter of his former master.

The circumstance which led to his becoming a novel-writer, was an application made to him by two booksellers, his intimate friends, to write for them a volume of letters in a familiar style, on subjects that might serve as models for the use of those who had not the talent of inditing for themselves. He extended the idea to the conveying of instruction in thinking and acting upon important occasions; and in composing some letters for the salutary purpose of teaching young females, who were going out to service, how to avoid the dangers into which they might be drawn, a story of a real occurrence which he had heard, came into his mind, and led to the production of *Pamela*. His fondness for letter-writing, led him to the then novel plan of writing a novel or story wholly by means of letters; a plan which he followed in two other novels, and which has frequently been adopted by subsequent writers.

In two months he completed the two volumes of which the work originally consisted, and in 1740 it was published. The reception it met with was enthusiastic: the novelty of the plan, the simplicity of the language, the natural and pathetic incidents of the story, and the sentiments of piety and virtue that it was his great object to inculcate, rendered it universally interesting, and made it an object of commendation, even from the pulpit.

Richardson's next work was *Clarissa*, the first two volumes of which appeared in 1748. This raised him to a high station in the estimation of literary persons. This tale attracted notice by the variety of its character, its minute developement of the movements of the human heart, the pathetic nature of some of its details, and the lofty image of female purity which it presents. The interest it excited during its progressive appearance, especially among female readers, was extraordinary: "the fate of no real personage could have agitated more bosoms than that of the fictitious heroine"—to use the words of Dr. Aikin. The work was spun out to a tedious length, no less than eight volumes; but that did not prevent it from bringing a high degree of reputation abroad

as well as at home. The style of writing so highly accorded with Rosseau's taste, that in a letter to D'Alembert, he said "nothing was ever written equal or approaching to it in any language." This excessive praise would probably meet with few supporters at the present day, however much the work may be admired.

His next novel was *Sir Charles Grandison*. In this, he wished to represent a perfect gentleman and Christian;—as he had before, in *Clarissa*, wished to portray a perfect model of female virtue. *Grandison*, was, however, less popular than *Clarissa*, perhaps because the novelty of his style had somewhat worn off and perhaps partly from the less-interesting nature of the story; and yet, as Aikin observes, *Grandison* is a work of more compass and invention, and the character of Clementina has, perhaps, no equal in delicate discrimination. Both of these works were translated into several foreign languages.

Acquisition of property accompanied the rise of his fame. In 1754, he became Master of the Stationers' Company; and in 1760, purchased a moiety of the patent of law-printer to the king. As he grew rich, he indulged himself with a country residence at Parson's Green.

In mixed society he was rather silent and reserved, and never got over the bashfulness incident to a man of feeling, and at the same time of humble origin; which reserve was rather strengthened than otherwise, by a great love of independence. Nothing however, could exceed his pietv moral worth, and general benevolence.

He was carried off by apoplexy, in the year 1761, at the age of seventy-two, and was buried at St. Bride's Church, Fleet-street. He was twice married; and out of a large family reared four daughters, who survived him. He was the author of many miscellaneous works; but his fame rests upon his three novels—*Pamela*, *Clarissa*, and *Grandison*. But it must be confessed, at the present day, that these novels, despite their beauty, are somewhat wearisome, on account of their prolixity. *Grandison* and its predecessor occupy each several large volumes; and this, which has been often cited as a proof of the industrious genius of the author, might rather be referred to a feeling of vanity. With his wonderful powers of invention, it was easy for him to spread his story over a large space; but his vanity (fostered by the admiring female critics of his manuscripts) did not allow him to condense. In truth, we may well apply to Richardson the celebrated distich which Pope applied to Dryden:—

> Even copious Dryden wanted, or forgot,
> The last, and greatest art, the art to blot.

As his writings had rendered him a kind of patron of the female sex, he had many amiable young friends of that sex, who were frequent visiters at his house, and who formed a circle of affectionate admirers, in which it was his delight to read his works, in the progress of composition, and to attend to the remarks of his auditors. Several of these visiters were women of excellent understanding and varied accomplishments, and the circle was beyond comparison more respectable than that in which Swift passed his trifling and misanthropical old age.

The great failing of this otherwise excellent and amiable man was vanity. Dr. Johnson, whose pride was above the weakness of vanity, thus criticizes the subject of our sketch. We quote the words of Boswell. "I only remember that he (Johnson) expressed a high value for his talents and virtues, but that his perpetual study was to ward off petty inconveniences, and to procure petty pleasures; that his love of continual superiority was such, that he took care always to be surrounded by women, who listened to him implicitly, and did not venture to contradict his opinions; and that his desire of distinction was so great, that he used to give large vales to Speaker Onslow's servants, that they might treat him with respect."

This love of approbation, as may well be supposed, made Richardson acutely sensitive of criticism; and he had much that was severe to encounter. Fielding assailed him, and produced a work intended for a caricature, but which has none of the ephemeral nature of such productions. This work was *Joseph Andrews*, in which the peculiar mannerism of the author of *Pamela* is attacked with powerful ridicule.

The highest compliment that can perhaps be rendered to a writer of fiction, was paid to Richardson, a few years ago, in the following remarkable manner, as related by Sir John Herschel:—

I recollect (says he) an anecdote told me by a late highly respected inhabitant of Windsor, as a fact which he could personally testify, having occurred in a village where he resided several years, and where he actually was at the time it took place. The blacksmith of the village had got hold of Richardson's novel of *Pamela, or Virtue Rewarded*, and used to read it aloud in the long summer evenings, seated on his anvil, and never failed to have a large and attentive audience. It is a pretty long-winded book; but their patience was fully a match for the author's prolixity, and they fairly listened to it all. At length, when the happy turn of fortune arrived, which brings the hero and heroine together, and sets them living long and happily together, according to the most approved rules, the congregation were so delighted as to raise a great shout, and procuring the church-keys, actually set the parish bells ringing. Now let any one say whether it is easy to estimate the amount of good done in this simple case. Not to speak of the number of hours agreeably and innocently spent; not to speak of the good fellowship and harmony promoted, here was a whole rustic population fairly won over to the side of good —charmed, and night after night spell-bound within the magic circle, which genius can trace so effectually, and compelled to bow before that image of virtue and purity, which (though at a great expense of words,) no one knew better how to body forth, with a thousand life-like touches, than the author of that work.

RICHARDSON'S HOUSE, AT PARSON'S GREEN.

HOWEVER individual persons may be gifted, those gifts, whilst they are made to be the instruments of public benefit, do not necessarily imply the excellence nor the happiness of their possessors.—J. S. M. ANDERSON.

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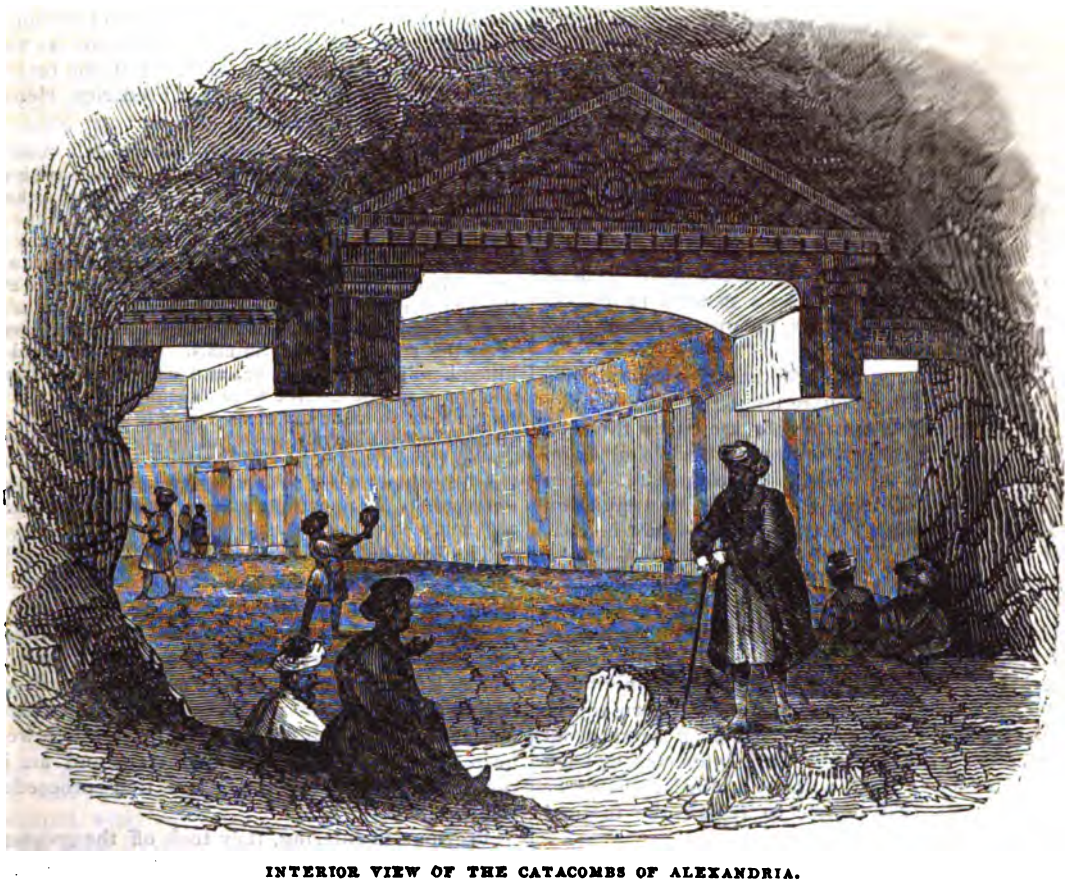
THE CATACOMBS OF EGYPT



INTERIOR VIEW OF THE CATACOMBS OF ALEXANDRIA.

Among the extraordinary scenes which distinguish almost every foot of that land of wonders, Egypt not the least curious are those subterranean cryptæ, or catacombs, in which the bodies of the ancient Egyptians were wont to find a resting place, when their earthly career was ended. The stupendous Pyramids seem to have been erected for a similar purpose, as far as modern research has enabled us to judge; but we now confine ourselves to those tombs which are excavated under ground, and not to the erection, such as the Pyramids, above ground.

In various parts of Egypt, both Upper and Lower, have these tombs and catacombs been discovered. Belzoni explored several in his progress towards the cataracts of the Nile; and the cryptæ of Nicropolis, near Alexandria, have been visited by several travellers: we shall endeavour to give a general idea of the whole in a limited space.

Dr. Clarke introduces the mention of them with the following remark:—"Among all the antiquities of this once celebrated city (Alexandria), which, after the destruction of Carthage, ranked next to Rome in magnitude and population, the Cryptæ of Necropolis are the least known, and the most wonderful." The expression "Cryptæ of Necropolis" may be understood as meaning "the tombs of the dark city," an expression fearfully indicative of the extraordinary scene which this subterranean burial place affords. Dr. Clarke thinks that the severe simplicity of their structure, and the nature of the Egyptian symbols found within them, prove that they are of earlier antiquity than the foundation of Alexandria by the Macedonians. They were both repositories for the dead and places of worship, whose dark and subterranean caverns were aptly suited to the ideas entertained of *hades*, the invisible abode of departed spirits, by the superstitious feelings of those times.

Subterranean sepulchres, such as these, are very prevalent in the countries bordering on the south and east of the Mediterranean sea, showing that the same feelings actuated people and nations spread widely apart. Even beyond the limits which we have mentioned, the same relics may be observed; for, as it has been remarked by Clarke, wheresoever the roving Phœnicians extended their colonies, whether to the remotest part of Africa or of Europe, even to the most distant islands of their descendants, the Celts in the Northern Ocean, the same rigid and religious adherence to this early practice may yet be noticed.

The natives, who act as guides to the catacombs of Alexandria, will not enter them without using the

precaution of taking a clue of thread, to aid in their return; travellers are, therefore, provided with a ball of twine and with several wax-tapers, before they enter the tombs. The tombs are situated to the westward of Alexandria, about half a league from it. The whole coast in the neighbourhood exhibits the remains of the sepulchres, which have been violated, and are now in ruins. An artificial reservoir, into which the neighbouring sea has now access, has received the name of Cleopatra's Bath, but for what reason does not appear; it is a basin hewn out of the rock, and was, perhaps, used as a place where the bodies of the dead were washed before they were embalmed.

The original entrance to the catacombs has been closed up and concealed, and the only place which now serves as an entrance is facing the sea, near an angle towards the north. The aperture is small, and made through the soft and sandy rock, either by burrowing animals, or by men who wished to ransack the cemeteries. The entrance is only just large enough to admit a visiter on his hands and knees; and it is not unfrequent for him to encounter jackals escaping from the interior. As a general protection from them and other intruders, the guides recommend carrying pistols.

On entering the aperture, the traveller arrives, by a gradual descent, into a square chamber, almost filled with earth. Smaller apartments are cut in the rock on the right and left, and each of these contains, on its sides, niches for the reception of mummies. When Clarke visited them, there was such an accumulation of sand in all of them, that they could not be examined without great difficulty.

On leaving the first chamber, the traveller enters a second, of still larger dimensions, on three sides of which are cryptæ, or tombs for the reception of mummies. Westward of this second chamber another aperture leads into a square chamber, without any receptacles for dead bodies. A south-western course now carries the traveller over heaps of sand, from one chamber to another, which are connected by such numerous passages, that, without a clue, the explorer would find it no easy matter to regain the original entrance.

These passages lead, by many windings, into the stately antechamber of the principal sepulchre, which appears as if it had been intended as a regal tomb. It is of a circular form, and surmounted by a beautiful dome, hewn out of the rock in an exquisite and delicate manner. The ornaments are few, and are cut out of the rock itself, and altogether a noble simplicity pervades the chamber. Our Frontispiece represents the interior of this circular chamber, from a drawing by Sir Robert Ainslie.

In some of the chambers are pilasters resembling the Doric in style of architecture, but they are all cut out of the solid rock. The entrance to the circular chamber is from the north-west; opposite to this entrance is a handsome square crypt, and to the right and left are other cryptæ, surrounded with places for the dead. Dr. Clarke endeavoured to penetrate further towards the south-west and south, and he found that another complete wing of the vast fabric extended in those directions, but the labour of proceeding was very great. The cryptæ upon the south-west side he found to correspond with those towards the north-east. In the middle between the two, a long range of chambers extends from the circular chamber towards the north-west, and it is in this direction that the original entrance is supposed to lie. Proceeding in this direction, a large room is *met* with between the circular chamber and the supposed original entrance near the sea. Further on, in the same direction, is a passage with galleries and spacious apartments on each side, and in front is a kind of vestibulum, or porch, but heaps of rubbish prevent the explorer from examining it closely; this might be the original entrance. So extensive are the chambers, passages, galleries, &c. forming the most wonderful monument of antiquity, that it occupied Dr. Clarke six hours in the exploration.

It is often remarkable to notice the different effects which the same scene will produce on different persons. Dr. Clarke, whose experience as a traveller has rarely been excelled, speaks in terms of enthusiastic admiration of the catacombs of Alexandria, and so do most who have visited them. Yet the reverse of this is sometimes the case. Sir Frederick Henniker, in his *Notes on Egypt*, says—

I went with a party to see the excavations. About two miles west of the town, some paltry chambers have been cut in the rock, and, being washed by the sea, are nicknamed the "Baths of Cleopatra." In the neighbourhood the stone-cutters have displayed their fancy in forming a kind of temple, and sundry chambers. These are called the *catacombs*, but are very inferior to those at Syracuse, or even to those at Paris. They are half filled with dirt, and a quantity of bones and holes indicate that these places have long been the resort of wild animals. An hyena had been killed here a few days before, and our guide discharged a musket at entering. We were also provided with the ship's line, which we made use of as a clue to our egress. The story of people having been lost is applied to these catacombs, in common with all others from the time of Theseus. Our arms were meant to be of use should the Arabs have attempted to fasten us in for ransom, a trick by no means uncommon.

The impression produced on travellers generally by these catacombs certainly does not accord with what is conveyed in these words.

Among the discoveries which Belzoni made in various parts of Egypt, were some tombs and catacombs similar to those at Alexandria. He describes one in the mountains of Gournon, the difficulties and intricacies of which far exceeded those which we have been describing. He hired two Arabs and an interpreter to accompany him; and they proceeded as follows.

Previous to entering, they took off the greater part of their clothes, and each having a candle, they proceeded through a cavity in a rock, which extended a considerable way into the mountain. In some places the passage was commodious, and in others they were obliged to creep on the ground, like crocodiles. After going through intricate windings, which quite excluded them from view of the entrance, they arrived at a large open space, into which many other cavities opened; and after the two Arabs had consulted and examined a little, all four entered one of these passages, which was very narrow, and continued downward for a considerable distance, through a craggy passage, till they came to two other apertures, which led horizontally into the interior of the mountain.

Belzoni had heard of a very large sarcophagus, which was contained in a part of this excavation, and of which he was in search. One of the Arabs now said to him, "This is the place." But the entrance to it appeared too small to admit the passage of the sarcophagus, which he had been told could be effected. He determined to explore through one of the horizontal apertures; but it was too small to admit him. But one of the Arabs and the interpreter passed through it, while Belzoni and the other guide waited for them. The two former proceeded evidently to a great distance into the interior of the mountain, when suddenly the interpreter was heard to cry out, "My God! My God! I am lost." A profound silence

cceeded, and on Belzoni questioning the Arab at s side, as to whether he had ever entered the aperre, he replied in the negative.

Belzoni now, in his perplexity, thought of returning obtain the assistance of some more Arabs, but was tonished to find that the Arab at his elbow expressed s ignorance of the way out. After calling aloud to e interpreter, and receiving no answer, Belzoni oped his way, as well as he could, back to a part of e excavation where several avenues met. Unable determine which was the right one, he had to ess at it, and entered one with the hope that it ould lead him to the outside of the mountain. He d the Arab proceeded, and as their candles were w nearly burned out, they were anxious to hasten wards; but what was their disappointment when ey came to the blank end of the passage they were without an outlet either to the right or left! They d nothing now to do but to retrace their steps to e spot where so many passages met.

Here they were as badly off as before: which pasge to explore they knew not. Both were exhausted, d their candles were nearly extinguished. After a mentary rest, Belzoni resolved to set a mark on e avenue which he had explored, and proceed along e others, one after the other, until he had attained object. On the second attempt, while passing fore a small aperture, he thought he heard somening like the roaring of the sea at a distance. He erefore entered that aperture, and as he advanced e noise increased, until he could distinctly hear a mber of voices, all at one time. At last he and e Arab emerged from the passage, and the first perm he saw was the interpreter—much to his astonishent. The interpreter informed him that in proeding with the Arab along the passage below, they me to a pit, which they did not see; that the Arab ll into it, and, in falling, put out the candles. It was en that he cried out "My God! I am lost!" because thought he should himself fall in, as the Arab had ne; but that on raising his head, he saw at a great stance a gleam of daylight, towards which he adnced, and thus arrived at a small aperture. He en scraped away some loose sand and stones, to iden the place by which he had escaped, and went give the alarm to some Arabs who were at the other ntrance. As they were all concerned for the man ho fell to the bottom of the pit, it was their noise hich Belzoni had heard in the cave.

The place by which the interpreter escaped was stantly widened, and it was then that Belzoni disovered that this entrance was known to the Arabs, ho had wilfully concealed it from him. The scheme as now apparent. The Arabs intended to show him he sarcophagus, without acquainting him with the venue by which it might be removed to light, and hen to bargain for a good round sum for revealing heir secret. Belzoni found that the sarcophagus was ot a hundred yards from the entrance at which they ow stood, although the Arabs had conducted him ound by such a wide circuit. The man who had llen into the pit was soon extricated, but was so uch hurt in one of his hips, that he was lamed for fe.

Belzoni subsequently found many other subterrae an or rocky sepulchres, in various parts of his urney. He thus describes some at Carnac.

Meanwhile I paid a daily visit to the tombs at Gournon. hese sepulchres are excavated in all directions in the cks, but generally with the entrance facing the east, as e chain of these mountains runs from north to south. hey are intermixed, of all sizes, and some of them have rticoes, hewn out of the rocks, before the entrance; but enerally they are within the outer door, which is mostly adorned with well-finished figures and hieroglyphics, and generally the watchful fox is represented at each side of the inner door, leading to the grotto. Some of them are very extensive, and run down in various directions, something like winding stairs, having on each side, at regular distances of a few paces, small chambers to deposit the mummies. Some have deep shafts, or wells, with excavations on each side of the shaft, to receive the mummies; and at the bottom of the wells are passages, leading to smaller apartments, with endless winding recesses. It was here that I had first leisure to examine and find the means of ascertaining where the entrances were to many of the tombs, which had been hidden for centuries from the eye of mankind.

It is unnecessary for us to extend these descriptions of catacombs, tombs, caves, &c.; for however they may differ from one another in minor points, they agree in this,—that they were the last resting-places of men who used to think that the departure of the breath of life from the human body was not reason sufficient for abandoning the cold clay to the worms, without such protection as moderns never think of bestowing on the dead. The Egyptians excelled in the art of embalming and preserving their dead bodies, and these sepulchral excavations were intended still more to secure the insensible remains of mortality. To deposit the bodies of the dead in caves was the primitive mode of disposing of corpses, and seems to have been particularly practised by the Phœnicians. The practice of open burial, in church-yards, &c., is due altogether to the Christians for its introduction. Among some nations, it has been customary, when a hero died, or was killed in a foreign expedition, to burn the body, as it would be liable to corruption, and for that reason could not be transported entire. The system was, having burned the body, to bring home the ashes, and then the *manes* or spirit would follow.

It is needless to say that where Christian principles prevail, such a custom as this is unknown, or is looked upon as one remnant of an age of mental debasement. The spark of life once extinguished, we feel assured of the operation of the most awful sentence ever pronounced on man—"Dust thou art, and unto dust shalt thou return."

It is not possible to indulge anger, or any other wrong feeling, and conceal it entirely. If not expressed in words, a child feels the baneful influence. The evil sympathies of his moral nature are excited as unconsciously, as his bodily frame may be affected by a subtle and destructive poison, infused into his lungs with the imperceptible atmosphere he breathes; and the beautiful little image of God is more and more defaced and disqualified for his home in heaven.—MRS. CHILD.

God is known by His power; that power is known by His works; and how shall we approach to estimate Him, unless we examine those works? It is not by assenting carelessly to the term All-powerful, that we shall learn to feel what that power is; it is not by barely admitting Him to be the cause of all things, that we shall acquire a knowledge of Him; that only knowledge which He has permitted us to acquire in our present condition.—MACCULLOCH.

When we turn our serious attention to the economy of the mind, we perceive that it is capable of a variety of processes, of the most remarkable and most important nature. We find also, that we can exert a voluntary power over these processes, by which we control, direct, and regulate them at our will,—and that when we do not exert this power, the mind is left to the influence of external impressions, or casual trains of association, often unprofitable, and often frivolous. We thus discover that the mind is the subject of culture and discipline, which, when duly exercised, must produce the most important results on our condition as rational and moral beings; and that the exercise of them involves a responsibility of the most solemn kind, which no man can possibly put away from him.—ABERCROMBY.

ENGLAND IN THE OLDEN TIME. No. VIII.

HUNTERS OF THE FIFTEENTH CENTURY.

IN our former article we treated of hunting, under the early kings of England. We shall now approach to more modern times.

King John, Edward the First, and Edward the Third, all took great delight in hunting. John's partiality for fine horses, as Strutt observes, is evident from his frequently receiving such animals, by way of payment, instead of money, for the renewal of grants, fines, and forfeitures, belonging to the crown. In the reign of Edward the First, hunting was reduced to a science, and regular rules established for its practice. Edward the Third took so much delight in hunting, that even at the time when he was at war with France, and resident in that country, he had with him in his army, sixty couples of stag-hounds, and as many hare-hounds, and every day he amused himself with hunting or hawking. It also appears that many of the great lords in the English army had their hounds as well as the king. Gaston, Earl of Foix, a foreign nobleman, contemporary with Edward, kept upwards of six hundred dogs in his castle, for the purpose of hunting; among whom were four greyhounds, whom he named Tristram, Hector, Brute, and Roland.

The bishops and abbots of the period at which we have now arrived, hunted with great state, having a large train of retainers and servants; and some of them are recorded for their skill in this pursuit. Walter, Bishop of Rochester, in the thirteenth century, was an excellent hunter, and so fond of it, that at eighty years of age he made it almost his only employment. In the fourteenth century, an abbot of Leicester surpassed all the sportsmen of the time in hare-hunting; and even when the higher orders of the clergy were travelling from place to place, upon affairs of business, they usually had both hounds and hawks in their train. When Thomas à Becket went as ambassador to France from Henry the Second, he took a large train of dogs and hawks with him. It was one of the laws of those times that, though the inferior orders of clergy were not permitted to hunt in the royal forests, they were allowed to do so in their own parks and enclosures: from this arose a custom of having an enclosure attached to every benefice, priory, &c., to be handed down from one possessor to another. At the time of the Reformation, there were thirteen parks, well stocked with deer, belonging to the see of Norwich.

It was by no means unusual, in those times, for ladies to accompany the gentlemen in their hunting-parties, and sometimes to form parties by themselves. Stag-hunting was the branch of the sport most favoured by the ladies; and the elegant and lightly-formed greyhound was much esteemed by them, and was considered a flattering present from one person to another. In the old ballad of "Sir Eglamore" a fair lady presents a greyhound to a favoured knight, in these words:—

> Syr, yf you be on hunting fonde,
> I shall you gyve a good greyhounde,
> That is dunne as a doo;
> For as I am trewe gentylwoman,
> There was never deer that he at ran,
> That myght yscape him fro.

Henry the First gave a charter to the citizens of London, to the effect that "the citizens of London may have chases, and hunt as well and as fully as their ancestors; that is to say, in the Chiltre, in Middlesex, and in Surrey." Other particular places or persons were occasionally honoured by a privilege of hunting. Thus Richard the First gave to Henry de Grey, of Codnor, the manor of Furroe, in Essex, with permission to hunt the hare and the fox, in any lands belonging to the crown, excepting only the king's own demesne park; and this special mark of the royal favour was confirmed by the succeeding monarch.

In the reign of Henry the Fourth, a treatise on hunting was written for the use of Prince Henry, which gives us some information as to the mode of hunting in those times:—When the king wished to hunt in the parks or royal forests, the master of the game, and the park-keeper, or the forester, was to see that everything was provided necessary for the purpose. The hunters and officers under the forester, with their assistance, were commanded to erect a sufficient number of temporary buildings, for the reception of the royal family and their train; and these buildings were to be covered with green boughs, to answer the double purpose of shading the company and the hounds from the heat of the sun, and to protect them from any inconvenience. in case of unfavourable weather.

It was the duty of the sheriff of the county in which the hunting was to occur, to furnish fit stabling for the king's horses, and carts to take away the game.

Early in the morning, upon the day appointed for the sport, the master of the game, with the officers deputed by him, were to see that the greyhounds were properly placed, and the person nominated to blow the horn, whose office was to watch what kind of game was turned out, and by the manner of winding his horn, to signify the same to the company, that they might be prepared for its reception upon its quitting the cover. Proper persons were then to be appointed at different parts of the enclosure, to keep the populace at due distance. The yeomen of the king's bow, and the grooms of his tutored greyhounds, were charged to secure the king's standing-place, and to prevent any noise being made to disturb the game before the arrival of his majesty. When the royal family and the nobility were conducted to the places appointed for their reception, the master of the game, or his lieutenant, sounded three long mootes, or blasts with the horn, for the uncoupling of the hounds. The game was then driven from the cover, and turned by the huntsmen and the hounds, so as to pass by the stands belonging to the king and queen, and such of the nobility, as were permitted to have a share of the pastime; who might either shoot at them with bows, or pursue them with the greyhounds at pleasure. The game which the king, or the queen, the prince, or princesses slew with their own bows, or particularly commanded to be let run, was not liable to any claim from the huntsmen or their attendants; but of all other game that was killed they had certain parts assigned to them by the master of the game, according to ancient custom.

Such an arrangement as this was for a royal hunt; but similar preparations were made upon like occasions, for the sport of the great barons and dignified clergy. Their tenants sometimes held lands of them, by the service of finding men to enclose the grounds, and drive the deer to the stands whenever it pleased their masters to hunt.

James the First preferred the amusement of hunting to hawking or shooting. It has been said of this monarch, that he divided his time betwixt his standish, his bottle, and his hunting; the last had his fair weather, the two former his dull and cloudy. One time when he was on a hunting party, near Bury St. Edmonds, he saw an oppulent tradesman, who had joined the chase, "very brave in his apparel, and so glittering and radiant that he eclipsed all the court." The king was desirous of knowing the name of that gay gentleman, and being informed by one of his followers that it was Lamme, he facetiously replied, "Lamb, call you him? I know not what kind of lamb he is, but I am sure he has got a fleece upon his back."

It is said that Queen Elizabeth was exceedingly fond of hunting; and the nobility who entertained her in her different progresses, made large hunting-parties, which she usually joined when the weather was favourable. "Her majesty," said one of the noblemen of the court, in writing to Sir Robert Sidney, "is well and excellently disposed to hunting, for every second day she is on horseback, and continues the sport long." Elizabeth was at this time fifty-six years old, and was then at her palace at Oatlands. Often, when she was not disposed to enter personally into the chase, she was entertained with the sight of the pastime. At Cowdrey, in Sussex, the seat of Lord Montecute, in 1591, one day after dinner, the queen witnessed, from a turret, sixteen bucks hunted down by greyhounds.

There was, at one period, a cruel law in existence, which subjected all the dogs that were found in the royal chaces and forests, excepting such as belonged to privileged persons, to be maimed, by having the left claw cut from their feet, unless redeemed by a fine.

The mode of hunting described above, as laid down for the use of King Henry, differs from that at present in use, inasmuch as the chace was carried on in an enclosure, so as to keep the hunted animal within a comparatively narrow sphere or range.

The old custom of the citizens of London going to hunt in Essex, at a certain season of the year, was made one of the exploits in a song commemorative of the wonders of London, written probably a century and a half ago.

> Next, once a year into Essex a hunting they do go,
> To see 'em pass along, O 'tis a most pretty show;
> My Lord he takes a staff in hand, to beat the bushes o'er,
> &c., &c.

We need not bring down the notice of hunting to more modern times, because this we could only do by using the sporting technicalities belonging to hunting, and which are more fitted to a regular treatise on the subject.

NICOLO PESCE, THE SICILIAN DIVER.

In a recent article on Diving we stated that many marvellous accounts were on record of divers, whose feats surpassed the bounds of human capability. The story of the celebrated Sicilian diver, Nicolo Pesce, or Nicholas the Fish, is a curious instance of human credulity, which probably would long since have been forgotten, had it not been that one of the master minds of Germany, the poet Schiller, has made this story the subject of one of those beautiful ballads, which contribute so greatly to the glory of the poet, and excite the admiration, as well of his countrymen, as of the general student in German literature.

Our object in the present article is, *first*, to relate the story of the Sicilian diver, and, *secondly*, to give the English reader an idea of the ballad of Schiller, where he will trace the same story, varied and adorned by the genius of the poet. There are several English translations of this ballad; but no one sufficiently adheres to the original meaning of the poet, to answer the purpose we have in view. We propose, therefore, to furnish an entirely new translation, the only merit of which consists in a close adherence to the original: the fine appropriate language, the peculiar style, and the rhythm of the poet, we are inadequate to supply. In some cases too we have been content to sacrifice the rhythm of our translation, rather than convey a meaning not warranted by the original.

The story of the Sicilian diver is given on the authority of Kircher, from the archives of the kings of Sicily.

In the times of Frederick, king of Sicily, there lived a celebrated diver, whose name was *Nicholas*, and who, from his amazing skill in swimming, and his endurance under water, was surnamed the *Fish*. This man had from his infancy been used to the sea, and earned his scanty subsistence by diving for corals and oysters, which he sold to the villagers on shore. His long acquaintance with the sea at last brought it to be almost his natural element. He was frequently known to spend five days in the midst of the waves, without any other provisions than the fish which he caught there, and ate raw. He often swam over from Sicily into Calabria, a tempestuous and dangerous passage, carrying letters from the king. He was frequently known to swim among the gulfs of the Lipari islands to the north of Sicily, no way apprehensive of danger

Some mariners out at sea one day observed something at a distance from them, which they regarded as a sea-monster; but upon its approach it was known to be Nicholas, whom they took into their ship. When they asked him whither he was going in so strong and rough a sea, he showed them a packet of letters which he was carrying to one of the towns of Italy, carefully done up in a leathern bag, so that they could not be wetted by the sea. He kept them company for some time in their voyage, conversing and asking questions; and after eating a hearty meal with them, he took his leave, and, jumping into the sea, pursued his voyage alone. To enable him to abide so long in the deep without inconvenience, nature seemed to have assisted him in a very extraordinary manner, for the spaces between his fingers and toes were webbed, as in a goose, and his chest became so very capacious, that he could take in at one inspiration *as much breath as would serve him for a whole day!*

The account of so extraordinary a person did not fail to reach the king himself, who commanded Nicholas to be brought before him. It was no easy matter to find Nicholas, who generally spent his time in the solitudes of the deep; but at last, after much searching, he was found, and brought before his majesty. The curiosity of this monarch had been long excited by the accounts he had heard of the bottom of the gulf of Charybdis*. He now therefore conceived that it would be a proper opportunity to have more certain information. He therefore commanded our poor diver to examine the bottom of this dreadful whirlpool; and as an incitement to his obedience, he ordered a golden cup to be flung into it. Nicholas was not insensible of the dangers to which he was exposed—dangers best known only to himself; and therefore he presumed to remonstrate. But the hopes of the reward, the desire of pleasing the king, and the pleasure of showing his skill, at last prevailed. He quickly jumped into the gulf, and was as quickly swallowed up in its bosom. He continued for three-quarters of an hour below, during which time the king and his attendants remained on shore, anxious for his fate; but he at last appeared, holding the cup in triumph in one hand, and making his way good among the waves with the other. It may be supposed he was received with applause when he came on shore: the cup was made the reward of his adventure; the king ordered him to be taken proper care of; and as he was somewhat fatigued and debilitated by his labour, after a hearty meal, he was put to bed, and permitted to refresh himself with sleep.

When the diver arose, he gave the king a narration of the wonders he had seen, which so much excited the curiosity of the monarch, that he tempted the diver to make a second descent. This proved fatal; for, after plunging again into the whirlpool, he was never more seen.

Let us now see the use which the poet Schiller has made of this story in his ballad of

THE DIVER.

"Who is there here, whether knight or squire,
Who dares dive into the gulf below?
A beaker† of gold I hurl therein,—
Its darksome mouth hath swallowed it now!
Whoever can show me that beaker again,
He its true owner shall remain."

These were the words of the king, while he hurled
From the height of the cliff, (which rugged and ste
Hangs over the edge of the boundless sea,)
The cup into howling Charybdis' deep:—
"Where is the bold one, I ask again,
Who into this nether deep plunges amain?"

Both the knights and the squires, who round him stoo
Heard him, but all continued mute:
They saw the cup sink in the horrible flood,
But none was there willing the prize to dispute;
And the king for the third time exclaimed aloud,
"Is there no one who dares to dive into the flood?"

Yet silent they lingered, as heretofore,
When a squire, as gentle as he was free,
Stepped forth from the squire's disheartened band,
And corslet and mantle aside threw he:
Both the men and the women around were amazed,
As on the bold youth they admiringly gazed.

While reaching the rock's precipitous brink,
And gazing awhile on the gulf below,
The waters Charybdis had swallowed down,
Roaringly vomits she up again now;
With the noise of the distant thunder's crash,
From Charybdis' dark womb they foamingly dash.

She undulates, seethes, she hisses, she roars,
As water and fire, when mingled together:
High up towards heaven the reeking spray soars,
Flood throngs upon flood without end, for ever:
Exhaustless and voidless for ever 'twill be,
As though from the sea would be brought forth a sea.

At length for a time this wild power was becalmed,
And mid the white foam a darkness they see,
A yawning gap widely distending its jaws,
So deeply, that Hades the place seemed to be;
While rapidly onward the swift surges whirl,
As downwards in form of a funnel they curl.

Now quick, ere the breakers return again,
The youth having prayed to the Author of good;
Already a shriek of horror is heard,
And away he is borne in the whirl of the flood:—
The jaws of this gulf closing gloomily o'er,
Seemed to threaten,—the swimmer shall rise no more.

To the surface just now from that depth comes no sou
But a howling at length is heard from that hell;
While tremblingly whisper the gazers around—
"Thou youth of the noble heart, fare thee well!"
More hollow it howls, and more hollow to hear,
While anxious they linger with horrible fear.

"The crown on thy head hadst thou thrown therein,
And hadst said,—'Whoever brings me the crown,
That crown shall he wear, and himself the king be,'—
For that rich reward I'd ne'er seek to go down."
What that bellowing deep holds concealed below,
No mortal successful may speed to know.

That whirlpool has seized upon many a ship,
And hurled it along down the fathomless wave,
While only a splintering keel or a mast
Struggled forth from the all-devouring grave.
Hark! nearer and nearer approaches the howl,
Like the rush of the storm with angry scowl

It undulates, seethes, it hisses, it roars,
As water and fire, when mingled together:
High up towards heaven the steaming spray soars,
Wave throngs upon wave without end, for ever:
With the noise of the distant thunder's crash,
From Charybdis' dark womb they foamingly dash.

But see! from out of her surgy womb,
Uprises there something as white as a swan;
And an arm and a bright neck are bar'd to the light,
As briskly it rows with vigour on.
'Tis he,—'tis he,—in his left hand high
Waves he the cup, nodding joyously.

With long drawn breath and pantings deep,
Heaven's light above now welcomes he;
Exultingly then the spectators exclaim,—
"He lives, he is there, he's not lost in the sea!
From the grave, where the bellowing waters roll,
Has the brave one 'scaped unharmed in soul."

* This is a dangerous whirlpool, at the eastern corner of Sicily. Another whirlpool, opposite to it, on the coast of Italy, was named Scylla. Between these, as formerly named, is the Strait of Messina. During a tempest, the waves are described by modern navigators as roaring dreadfully, when driven into the rough and uneven cavities of the rocks.

† A cup having a lip or beak, shaped like the beak of a bird, and hence called a *beaker*.

And he comes, by the throng exulting surrounded,
At the feet of the king exhausted he falls;
Kneeling restores he the beaker again,
While the king to his beauteous daughter calls:—
The beaker she brims with wine that glows,
While thus to the king did the youth disclose:—

"Long live the king! They may well be gay,
Who to breathe in this rosy light remain;
For horrible 'tis 'neath yonder spray:
Men never should tempt their fate in vain;
And seek to discover,—never, oh! never,—
What darkness and dread kindly hide for ever.

"Down was I borne, as on lightning's swift wing,
Through the portals of rock with the eddy I rushed,
Where rapid and wild rose the source of a spring,
Which seized me all helpless, as upwards it gushed:
As a top, causing giddiness, swift will rotate;
So turned I, no longer withstanding my fate.

"And then, in my greatest, my terrible need,
I called on my God,—He showed me beneath,
Jutting out in that chasm, a ledge of the rock,
Which nimbly I seized, and escaped from death.
There the beaker had caught on a coral stone,
Or into the bottomless deep it had gone.

"Beneath me then everything mountain-deep lay,
Gleaming in purple obscurity;
And, although from the ear every sound stole away,
With horror the eye sought those dread deeps to see;—
How basilisks, dragons, and sea-serpents moved
'Mid the vengeance of hell, in that dreadful flood.

"Black, and in horrible medley they swim,
Or in grisly masses themselves uproll;
The mallet—with hideous deformity,
Haberdines, and the ray, full of poisons foul,
With menacing gestures their teeth fix at me;
Frightful sharks, the hyenas of the sea.

"'Mid so many shapes of deformity,
My bosom alone knew compassion here:
In the ghastly despair of its loneliness,
I held by the rock-reef in conscious fear;
Sunk deep, far away from men's succour or sound,
With the monsters of this loathsome waste around.

"I shudder to think on't; but onwards to me
Came a monster, a centipede, crawling slow;
It would snap! in my terror's uncertainty
I loosened my grasp from the coral bough:—
I was seized by the whirl of the flood, which passed nigh;
'Twas for my salvation: it hurled me on high."

He paused—while with wonder the breast of the king
Became full; but who answered—"The beaker is thine;
And further, I destine for thee this ring,
On which a rich jewel doth brightly shine,
If thou tryest once more, and further show'st me
Of the things at the nethermost ground of the sea."

With feelings more tender his daughter heard,
With lips that caressed she expressed thus her care,—
"Oh Father! let this cruel enterprise end;—
For you he has dared what none else would dare:
If unable to conquer thine heart's stern desire,
Bid some of these knights surpass the squire."

Then the king snatched quickly the beaker again;
Re-hurled it far into the raging sea:
"Place thou the beaker before me again,
Thou, of my knights the most favoured shalt be;—
And to-day, as thy wife, thou shalt surely embrace
Her, who now pleads with that downcast face."

Then his soul with a heavenly impulse was seized,
And boldly his eyes lighted up at the boon;
He saw the deep blushes of that beauteous maid,
And he saw her grow pale, and fall down in a swoon;
All this urged him on the loved prize to win;
Come life, or come death, again he plunged in.

The breakers they hear swelling in and away,
Proclaiming, alas! but a thundering sound:
With solicitous gaze near the whirlpool they stay;
Rushing on, rushing on, only water is found.
The waves they gush up, and gush down, as before;
But none the bold swimmer to day-light restore.

RAIN INDICATED BY CLOUDS.

The Rev. R. Walsh, in his narrative of a journey from Constantinople to England, remarks: "That it would have been quite impossible for a large city to have existed on the spot where Constantinople is situated, if some artificial means had not been devised to supply the deficiencies of nature, as it regards water. The first of these means are cisterns and wells, constructed at the bottoms of houses, as reservoirs, to save the rain-water that falls in winter; but to a people like the Turks, to whom water is a religious as well as a natural want, and who use it for ablution as well as drinking, it was necessary to have a much more abundant supply; and this is found in the bends or tanks which they have constructed in the mountains, near the shores of the Black Sea. These mountains are the regions of streams and showers; and wherever a small rill is found running into a valley on any elevation, a mound is raised across the lower end, and the water thus obstructed is thrown back, and accumulated till it forms a large, deep, and triangular lake. This mound is generally faced with marble, covered with sculptures of oriental device, and has a very grand and magnificent appearance. Pipes formed of tiles, moulded into tubes, convey the water along the hills; and when a valley interposes, it is crossed by an aqueduct. Some of the aqueducts are very striking and noble in perspective.

"I passed the autumn of 1822 near one of the largest and most important of these reservoirs. The summer had been remarkably dry; and it appeared, from a table that I kept, that it had not rained from the 4th of April, to the 2nd of November, with the exception of a few passing showers. The water in the tanks or bends became low and muddy, and the Turks took the alarm. The water-engineers were sent out, and I accompanied them to some of the bends; they measured the quantity of water, and they found no more than sufficient to supply the city for fifteen days! Judge of the consternation of seven hundred thousand persons suddenly deprived of an element essential not only for domestic uses, but religious also, and having no other possible mode of obtaining it. Prayer was offered up in the mosques, and the sky was anxiously watched. The immutability of things in the East, and the illustrations given to the writings of former times, is not the least pleasure a person experiences in these countries. The approach of rain is always indicated here as it was in Syria, by the appearance of a small, dark dense, circumscribed cloud, hanging over either the Euxine or Propontis. A dervish stands on the top of the giant's mountain; and when he sees a cloud, he announces its approach, like Elijah from the top of Carmel. I one day climbed to the same place and saw the dervish on the watch, and 'I looked towards the sea, and beheld a little cloud rising out of the sea, like a man's hand, and gat me down that the rain stopped me not.' In effect, it immediately followed, and the Turks were relieved from a very serious cause of anxiety."

The destiny of woman, as we see, is not a trifling destiny,—the mission of woman is not a trifling mission,—the influence which she possesses and exercises is not a trifling influence. Ought women then to be trifles? Ought their education and their pursuits to embrace only a round of elegant trifles? Should the cultivation of external graces form the chief object in the training of beings so influential and responsible? Such training adds to their influence, while it takes from them the power of directing it, and increases their responsibilities, without imparting the capacity requisite for their fulfilment. There is nothing so dangerous as the possession of influence, undirected by conscientiousness, and it seems playing with the destinies of society to allow such powers to remain in hands so little fitted to direct them.

The influence of women is, or ought to be, a moral influence; and that it may have its full effect, the main object of their education ought to be to expand and perfect their moral nature, and to implant deeply the fact of their influence, and their own consequent responsibilities. This foundation being laid, let women be elegant, be accomplished, be everything that society requires of them; but let them not forget that these powers are not given for themselves, but for God's glory and the good of their fellow-creatures. Thus shall they be not only caressed, admired, honoured, but happy; happy in the happiness of unselfishness, of devotedness, of love,—the only happiness here below which can give us any foretaste of that which is to be enjoyed above.—*Woman's Mission.*

VALUE OF WATER IN EASTERN COUNTRIES.

THE exhaustion of a supply of water in the burning and inhospitable desert, without the prospect of a fresh supply, is a situation of such utter misery and danger as cannot well be imagined by those who have not themselves been exposed to something of the kind. The furnace-heat of these arid deserts increases greatly the ordinary demands of nature for drink, while the uncertainty of a fresh supply renders the exercise of unusual economy necessary. But when the water in the water-skins is spent, the merchant whose camels are laden with the rich products of India becomes at once a beggar. In that agony of suffering which extreme thirst in the hot unsheltered desert excites, such a man would cheerfully give all his camels, and all the wealth with which they are laden, for the mouthful of water which has been preserved in a water-bag by some poor creature who is now the only object of his envy. But the latter scorns the paltry bribe, knowing that precious drop to be his only hold upon existence. In the instance of Ishmael: 'And the water was spent in the bottle, and she cast the child under one of the shrubs.' Ishmael, although a young man, being less inured than the poor 'bondwoman' to the trials of the desert, began to fail sooner, and needed the assistance of her support. But when the usual symptoms came upon him—when his eyes became painfully inflamed—and his parched lips and tongue chapped and swollen—when his brain seemed to grow thick and inflamed, and he was deafened by the hollow sound in his ears—some bushes offered a shelter under which he would fain lie down and die! He lay down; and his affectionate mother withdrew, that she might not see his unrelieved death, and that she might 'lift up her voice and weep' without restraint.

The following passage from Malte Brun may enable the European reader to form some idea of the horrors of the desert, and of the sufferings occasioned by excessive thirst, in regions where the fainting and dying traveller would give all the treasures he possesses for a cup of cold water.

In describing the desert of Mesopotamia, he remarks:—"It is a continuation, and, as it were, a branch of the Great Arabian Desert on the other side of the Euphrates. Saline plants cover, at large intervals, the burning sand or the dry gypsum. Wormwood spreads here, as the furze in Europe over immense tracts from which it excludes every other plant. Agile herds of gazelles traverse those plains, where many wild asses formerly roved. The lion, concealed in the rushes along the rivers, lies in wait for these animals; but when he is unable to seize them, to appease his hunger, he sallies forth with fury, and his terrible roaring rolls, like thunder, from desert to desert. The water of the desert is, for the most part, bitter and brackish. The atmosphere, as is usual in Arabia, is pure and dry; frequently it is burning in the naked and sandy plains; the corrupt vapours of stagnant waters are diffused there; the exhalations of the sulphureous and salt lakes increase the pestilential matter. Whenever any interruption of the equilibrium sets a column of such infected air into rapid motion, that poisonous wind arises, which is called Samum or Samyel, which is dreaded less in the interior of Arabia than on the frontiers, and especially in Syria and Mesopotamia. As soon as this dangerous wind arises, the air immediately loses its purity, the sun is covered with a bloody veil, all animals fall alarmed to the earth, to avoid this burning blast, which stifles every living being that is bold enough to expose itself to it.

"The caravans which convey goods backwards and forwards from Aleppo to Bagdad, and have to traverse these deserts, pay a tribute to the Arabs, who consider themselves as masters of these solitudes. They have also to dread the suffocating wind, the swarms of locusts, and the want of water, as soon as they leave the Euphrates.

"A French traveller affirms that he was witness to a scene occasioned by the want of water, the most terrible that can be imagined for a man of feeling. It was between Anah and Dryjea. The locusts, after they had devoured everything, at last perished. The immense numbers of dead locusts corrupted the pools, from which, for want of springs, they were obliged to draw water. The traveller observed a Turk, who, with despair on his countenance, ran down a hill, and came towards him. 'I am,' cried he, 'the most unfortunate man in the world! I have purchased, at a prodigious expense, two hundred girls, the most beautiful of Greece and Georgia. I have educated them with care. I am taking them to Bagdad to sell them to advantage. Ah! they perish in this desert for thirst, but I feel greater tortures than they.' The traveller immediately ascended the hill; a dreadful spectacle here presented itself to him. In the midst of twelve eunuchs and about a hundred camels, he saw these beautiful girls, of the age of twelve to fifteen, stretched upon the ground, exposed to the torments of a burning thirst and inevitable death. Some were already buried in a pit, which had just been made; a great number had dropped down dead by the side of their leaders, who had no more strength to bury them. On all sides were heard the sighs of the dying; and the cries of those, who, having still some breath remaining, demanded in vain a drop of water. The French traveller hastened to open his leathern bottle, in which there was a little water. He was already going to present it to one of these unhappy victims. 'Madman!' cried his Arabian guide, 'wouldst thou also have us die from thirst.' He immediately killed the girl with an arrow, seized the bottle, and threatened to kill any one who should venture to touch it. He advised the slave-merchant to go to Dryjeh, where he would find plenty of water. 'No,' replied the Turk, 'at Dryjeh the robbers would take away all my slaves.' The Arab dragged the traveller away. The moment they were retiring, these unhappy victims, seeing the last ray of hope vanish, raised a dreadful cry. The Arab was moved with compassion: he took one of them, poured a drop of water on her burning lips, and set her upon his camel, with the intention of making his wife a present of her. The poor girl fainted several times when she passed the bodies of her companions, who had fallen down dead in the way. Our travellers' small stock of water was nearly exhausted, when they found a fine well of fresh and pure water; but the rope was so short that the pail would not reach the surface of the water. They cut their cloaks in strips, tied them together, and drew up but little water at a time, because they trembled at the idea of breaking their weak rope, and leaving their pail in the well. After such dangers they, at last, arrived at the first station in Syria."

CONSTITUTED as we are, and placed in certain relations to objects of sense, and to other sentient beings, we are, in some degree, under the influence of external things. But the powers which wield the destiny of our happiness are chiefly within. It is there that we trace the elements of those noble faculties, which if duly cultivated, secure at once, our usefulness and our happiness;—and it is there that we find the germ of those vulture passions, whose dominion is worse than eastern bondage, and under whose relentless tyranny a man who is master of the world may be himself a slave. In the conquest of these consists the highest dignity of our nature,—and in the control and subjugation of them is our only solid peace. We are, in the first place, reminded that remarkable power which we possess over the succession of our thoughts. We can direct the thoughts to any subject we please, and can keep them directed to it with steady and continuous attention. In the due culture of this power, consists a point in mental discipline, of primary and essential importance. By the neglect of such culture, the mind *is* allowed to run to waste amid the trifles of the *passing* hour, or is left the sport of waking dreams, and *vain* delusions, entirely unworthy of its high destiny. There is not a greater source of difference between one man and another than in the manner in which they exercise this power over the succession of the thoughts, and in the subjects to which these are habitually directed. It is a mental exercise which lies at the foundation of the whole moral condition. He who, in early life, seriously enters upon it under a sense of its supreme importance, who trains himself to habits of close and connected thinking, and exerts a strict control over the subjects to which his thoughts are habitually directed,—leading them to such as are really worthy of his regard, and banishing all such as are of a frivolous, impure, or degrading character, this is he who is pursuing the highest of all earthly acquirements, the culture of the understanding and the discipline of the heart. He who does not earnestly exercise it, but who allows his mind to wander, as it may be led by its own incidental images or casual associations, or by the influence of external things to which he is continually exposed, endangers his highest interests, both as an intellectual and a moral being.—ABERCROMBY.

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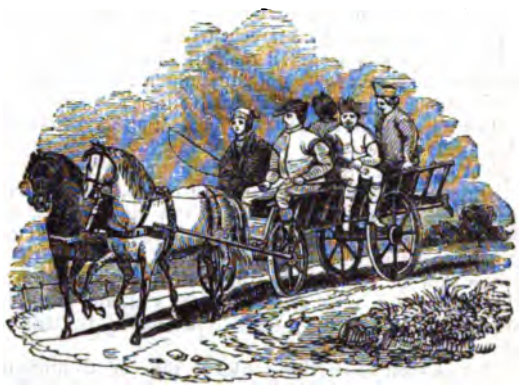
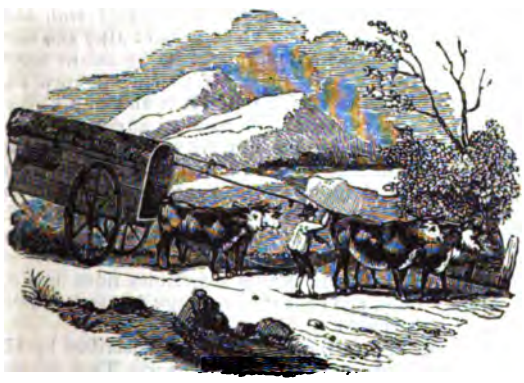
MODERN FRENCH DILIGENCE.

RUSSIAN DROSKY.

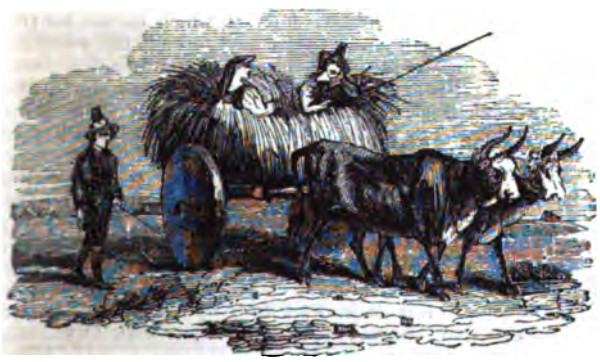


SWEDISH TRAVELLING WAGON.

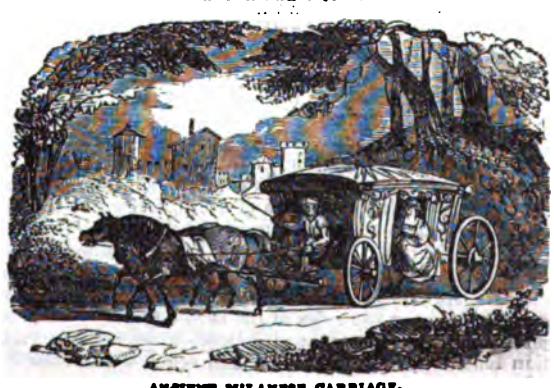


SOUTH AMERICAN WAGON.

TARTAR PALANQUIN.



CALABRIAN CART.



ANCIENT MILANESE CARRIAGE.

GLANCES AT THE MODES OF TRAVELLING IN FOREIGN LANDS.

How various have been the contrivances for locomotion,—for the conveyance of goods and passengers from place to place! The inferior animals, though they roam about certain districts, yet they confine themselves within comparatively narrow limits: if they find the means of supporting life, they are satisfied, and have no impelling motive for visiting new spots. Not so man! The desire of gain, the desire of visiting spots which have become hallowed by important events which have transpired there, or which present remarkable objects, either of nature or art, all influence man in wandering over the face of the globe. The natives of almost every European nation have visited every country on the face of the earth, with a few exceptions; and the more civilization and commerce are extended, the more close will this intercourse be.

The great medium of communication between distant countries is by means of ships passing over the wide ocean. Navigation has occupied several supplements in this work, and we therefore need not dwell on that mode of travelling; but we propose to glance briefly at the various modes of land-travelling in different countries. Land-travelling in England has now assumed such an important position, that we must reserve a separate Supplement for it, and confine ourselves at present to "Land-travelling abroad."

The most obvious means of locomotion is *walking*, and this is the one which is adopted by all nations in the rudest stages of civilization. Walking over a wild country, in which no resemblance of a path exists, is the rudest of all modes of travelling, and such was the mode among the American Indians, in the vast forests and plains of central America. The course of the sun, the moon, and the stars,—the flow of rivers,—the difference between the side of the trunk of a tree exposed to the sun, and the opposite side,—are some of the means by which the Indians supply the want of roads.

But as soon as anything like a regular communication is held between different places, a path is formed, along which travellers proceed; and as soon as they have domesticated animals to act as beasts of burden or of draught, the path becomes widened, so as to receive the animal. Horses, mules, oxen, camels, asses, and dromedaries, are among the animals that have been employed for this purpose.

The horse is the most valuable of all these quadrupeds, and in Iceland is almost the sole means of conveyance from place to place, not only as a saddle-horse, but also to carry provisions and merchandise. The pack-horses have, when pursuing a journey, a sort of bed or matting of turf fixed across their backs, and on this are placed two oblong deep boxes, slung over, so as to hang one on each side. In these boxes are kept the provisions, clothes, and other necessaries required by the travellers. This mode of packing is universal throughout the island; for all the articles which are brought from the interior, for sale at the seaports, and all those taken back for winter consumption, are packed and carried in this way. "There is not in all Iceland such a machine as a wheel-carriage," says Mr. Barrow, 'no, not even a wheel-barrow; and, indeed, if there were, they would be useless, as there is nothing in the shape of a road, on which they could move. The *way*, or the *path*, either lies over beds of lava, so ragged that the horses are obliged to pick their way; or over boggy ground, where it is equally necessary to avoid those places into which the animals might sink up to their belly, and which, when left to themselves, they are remarkably skilful in detecting. In some places the path resembles a deep rut, formed by the cracking or disruption of a stream of lava; and here the rider is pretty much in the predicament of the Irishman who was carried in a sedan-chair, without a bottom to it; for in all such places we were able to relieve our horses, by putting our feet on the two sides of the sunken path." Such is the sum and substance of our information respecting travelling in Iceland: for where roads and vehicles are almost unknown, *the traffic* assumes a very primitive character *indeed.*

The mule is one of the most remarkable of all animals, for sure-footedness in travelling. In various districts of South America, and in the mountainous parts of Spain, the mule is almost the only beast of burden; and it is astonishing to see the sagacity which they often display. Much of the internal traffic of Spain is carried on by means of muleteers, or mule-drivers, who traverse extensive districts where no carriage whatever could penetrate.

In ascending the mountainous districts of America, Humboldt found that the mules were so sure-footed as to inspire the greatest confidence. Their habits are the same as those of the beasts of burden in Switzerland and the Pyrenees. In proportion as a country is more savage, the instinct of domestic animals seems to increase in address and sagacity. When the mules feel themselves in danger, they stop, turning their heads to the right and left; the motion of their ears seems to indicate that they reflect on the decision they ought to take. Their resolution is slow, but always just, if it be free; that is to say, if it be not crossed or hastened by the imprudence of the traveller. It is on the frightful roads of the Andes, (such an one at is shown in p. 253,) during journeys of six or seven months, across mountains furrowed by torrents, that the intelligence of horses and beasts of burden displays itself in an astonishing manner. Thus the mountaineers are heard to say, "I will not give you the mule whose step is the easiest, but him who *reasons* best." "This popular expression," as Humboldt observes, "dictated by long experience, combats the system of animated machines better, perhaps, than all the arguments of speculative philosophy."

In some countries, the ass is the animal which takes the place of the mule. This is the case at Cairo, and other places in Egypt. Mr. Carne says that in one of the streets of Cairo stand daily a large number of asses, for hire: immediately on entering it you are assailed and hemmed in on every side, each recommending his own animal. They are handsome little creatures, of quite a different breed from those of Europe, with elegant saddles and bridles. Some are of a pure white or black colour: they are used by all ranks, and go at a rapid pace. You pay so much by the hour, and the Arab master, with a long stick in his hand, runs behind or beside you. It is amusing enough to gallop in this way through the crowded streets of Cairo, at one time avoiding, by the dexterity of the Arab, a tall camel, or a soldier mounted on a fine charger; at another, jostling foot-passengers, or encountering humbers alike mounted with yourself; while the Arab attendant shows infinite dexterity in warding off obstacles, calling out loudly all the time to clear the way.

The traveller over the Andes sometimes rides in a chair, on a man's back, and sends his luggage forward, drawn by oxen. (See page 252.)

This mode of crossing the Andes, as described by Humboldt, is as extraordinary as it is perilous. That illustrious traveller crossed the Andes at the mountain of Quindiu, which is the most difficult passage in the range, and which presents a thick uninhabited forest, which cannot be traversed in less than ten or twelve days, even in fine weather. Travellers usually furnish themselves with a month's provision, as it often happens that the melting of the snow, and the sudden floods arising therefrom, prevent them from descending. The highest point of the road is 11,500 feet above the level of the sea, and the path, which is very narrow, has in several places the appearance of a gallery dug in the rock, and left open above. The oxen, which are the beasts of burden commonly used in the country, can scarcely force their way through these passages, some of which are 6562 feet in length. In crossing the mountain, Humboldt was followed by twelve oxen, carrying his collections and instruments. His shoes were torn by the prickles which shoot out from the roots of the bamboos, so that, unwilling to be carried on men's backs, he was obliged to walk barefoot. The usual mode of travelling, however, is in a chair tied to the back of a *carguero*, or porter. There is a

constant supply of robust young men at the foot of the Andes, who are willing to barter their services in this way, notwithstanding the perilous and fatiguing nature of the employment. When crossing the forests of Quindiu, they take with them bundles of the large oval leaves of the *vijao*, a plant of the banana family, the peculiar varnish of which enables it to resist rain. A hundred-weight of these leaves is sufficient to cover a hut large enough to hold six or eight persons. When they come to a convenient spot, where they intend to pass the night, the carriers lop a few branches from the trees, with which they construct a frame; it is then divided into squares, by the stalks of some climbing plant, or threads of agave, on which are hung the vijao leaves, by means of a cut made in them. In these temporary tents travellers are kept from the rain during their sojourn.

In many parts of America, the traveller is assisted to a path by a natural bridge, which crosses a ravine of terrific depth, and which they could not otherwise pass. Such a bridge is the Natural Rock-bridge of Virginia, which, however, is far surpassed, in terrific grandeur, by another which we shall describe, and which is also represented at the foot of the present article.

The natural bridges of Iconizzo, in South America, are formed by masses of rock lying across a ravine of immense profundity. The valleys of the Cordilleras Mountains are generally crevices, the depth of which is often so great, that if Mount Vesuvius was placed in them, its summit would not exceed that of the nearest mountains. One of these, viz., that of Iconizzo, is peculiarly remarkable for the singular form of its rocks, the naked tops of which present the most picturesque contrast with the tufts of trees and shrubs which cover the edges of the gulf. A torrent, called the Summa Paz, forms two beautiful cascades where it enters the chasm, and where it again escapes from it. A natural arch, forty-eight feet in length, and thirty-nine in breadth, stretches across the fissure at a height of 318 feet above the stream. Sixty-four feet below this bridge is a second, composed of three enormous masses of rock, which have fallen so as to support each other. In the middle of it is a hole through which the bottom of the cleft is seen; and the torrent, viewed from this place, seemed to flow through a dark cavern. An engraving of this extraordinary natural bridge will be found in page 256.

We shall not here enter into the subject of bridges, as they have been treated of in a supplement in a former volume; but we may here just allude to a very rude approximation to a bridge constructed over rivers in Norway. It will be seen that logs are laid on one another on each side of the river, each row of logs projecting further outward than the row beneath it, until at last the opposite piles meet in the middle at the top; and thus is constructed a rude road over a stream, as represented in p. 252.

But to return to roads of another character, and to the beasts of burden used on them. We have said that the mule is much employed in traversing the mountainous districts of America. It is sometimes saddled, and ridden by a horseman,—sometimes used in the manner of a pack-horse, with a burden of packages on its back,—and at other times harnessed to a vehicle. But this latter employment is of no avail in the lofty region of the Andes, where a path is often only just wide enough to admit the four feet of a mule, and where the least false step would precipitate the animal many thousand feet down a precipice.

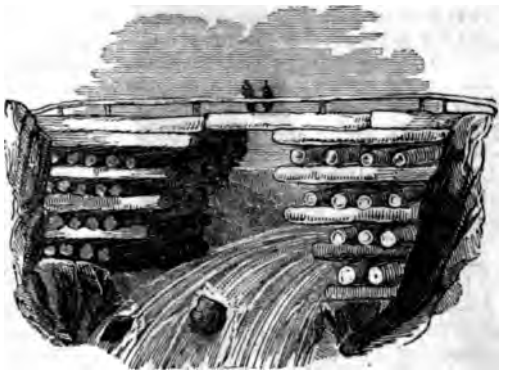
But in the extensive plains of Brasil and Chili, the mule is employed both to draw vehicles, and to bear burdens on its back, and thereby to fill the same office as a wagon or van would do in Europe. Large troops of mules convey merchandise through different parts of Central Brazil. The European, accustomed to the conveyance of considerable burdens in wagons, is astonished at the sight of so many cargoes divided into small parcels, which are abandoned to the discretion of the beasts, or of an unskilful driver, daily loaded and unloaded several times, either in the open air or in exposed sheds, scarcely protected against the rain and the weather, and often carried in this manner for several hundred miles. The caravans, however, particularly on the better road from St. Paul and Minas to the capital, are so well organized, that comparatively very little risk is to be apprehended. Each caravan, consisting of from twenty to fifty mules, is conducted by an *arreiro* on horseback: he gives the necessary orders for the caravan to set out, to halt or to encamp for the night; takes care that the burdens are well balanced, and the pack-saddles in good condition; repairs them when they gall, cures the sick beasts, and attends to the shoes. Under him are the drivers, each of whom, generally, has to manage a division of seven mules. They go on foot, put the burdens off and on, feed and water the animals, drive them to the pasture, and cook the provision. The *arreiro*, generally a free mulatto, attends to the sale and purchase of goods in the city, and acts as commissioner for the proprietor of the caravan. The drivers are, for the most part, negroes, who soon become accustomed to the employment, and prefer this wandering life to the labour of gold-washing and working in the plantation.

The word "caravan," however, draws our attention to another, and perhaps still more valuable, animal than the mule,—we mean the *camel*. How do Eastern romances, poets, histories, and legends, teem with notices of the camel,—the ship of the desert, (as it has been beautifully called)—its power of enduring thirst when traversing the vast deserts of Asia and Africa,—and its great endurance of fatigue! It is employed in the East both as a beast of burden, and for riding, and is the general means of travelling from place to place. Mr. Carne describes the first sensation, when mounted on a camel's hump, as being anything but pleasant. The rider is at no inconsiderable height from the ground, and the jolting of the animal at each of its long steps seriously discomposes the rider's bones. But such is the effect of habit, that men and women, adults and children, hale and sickly, ride on these animals; and, in traversing the deserts, a large number of travellers go together for mutual security, and form a *caravan*, such as the caravans of Mohammedan pilgrims, &c.

Assuredly one of the most striking species of travelling which the world has seen, is the pilgrimage of Mohammedans to Mecca. According to the laws of the Koran, every Mohammedan who has the means, is enjoined to make a holy journey to Mecca once in the course of his life. For this purpose the pilgrims form caravans or companies, for mutual protection; and as Mohammedanism is spread through a wide extent of country, in Europe, Asia, and Africa, these caravans proceed in different directions towards Mecca. One starts from Constantinople, and collects in its progress the pilgrims from the northern parts of Asia, proceeding by way of Damascus and Medina. One starts from Cairo, with the Egyptian pilgrims, and proceeds by way of Suez into Arabia, and along the shore of the Red Sea. A third leaves Bagdad, and brings the Mohammedans from Persia and the surrounding parts. A fourth traverses the northern parts of Africa, collecting in its route, the pilgrims from Barbary, Morocco, Tunis, Tripoli &c. to the coast of Egypt, and so onwards to Arabia. Two or three other caravans come from India and the tribes in the neighbourhood of the Persian Gulf.

These devotees comprise every class of Mohammedans, from high to low; and the wealthy make a great show of their splendour, while the poorer pilgrims contrive to combine some small mercantile adventure with their devotion, to defray their expenses. The number of pilgrims in each caravan is often enormous, sometimes amounting to 40,000, with an almost incredible number of camels. The Egyptian caravan has been known to be accompanied by 64,000 of these animals, one grandee having no less than 110 for the carriage of his baggage and retinue; indeed Burckhardt estimated the travelling expenses of this noble at not less than 10,000*l*. One of the Sultans of Egypt, in by-gone times, had among his retinue 500 camels for carrying sweetmeats and confectionary; 280 for pomegranates, almonds, and other fruits; and he took besides, 1000 geese, and 3000 fowls with him,—a respectable larder! The celebrated caliph Haroun al Raschid, and his queen, performed the pilgrimage on foot from Bagdad, a distance of 1000 miles, with the precaution, however, of having the road for each day's journey covered with fine carpets.

The caravan from Turkey and Syria is one of the most important. During the whole route, for the sake of safety and convenience, it is attended from town to town by the armed force of the district. From Damascus to Medina it moves with great pomp across the desert, a journey of thirty days; and here a change of camels, for which the Bedouins contract, is necessary; the Anatolian breed being unable to bear the fatigues of such an expedition. The pasha of Damascus, or one of his principal officers, always attends it, and gives a signal for encamping and departing by firing a musket. The different classes of pilgrims know their exact station, and always place their tents according to their town or province. At every stage is a castle or store-house, with a small garrison, and a large tank at which the camels drink. These stations are seldom further



NORWEGIAN BRIDGE.

CARGUEROS, OR MEN-CARRIERS OF SOUTH AMERICA.

distant from each other than a march of eleven or twelve hours. The usual time of travelling is from three o'clock in the afternoon to a little after sunrise next day, torches being lighted during the night, and the pilgrims encamping during the forenoon.

In this way do the Mohammedan pilgrims traverse sandy and parching deserts from all quarters towards Mecca, the holy city of Mohammed, into which the caravans enter with great pomp, accompanied by their guards and by martial music. Their travelling-dress is now thrown off, and they put on the *ihram*, or pilgrim's cloak, which consists of two pieces of linen, woollen, or cotton cloth; one of which is wrapped round the loins, and the other thrown over the neck and shoulders so as to leave part of the right arm uncovered.

In the course of these journeys of caravans, whether for trade or for devotion, across sandy deserts, the travellers are frequently overtaken with a *sand-storm*, that is, a hurricane of wind which drives the sand before it with irresistible violence, curling it up in foaming hillocks which nothing can contend against. At such a moment, men, horses, and camels are stricken with terror, and lie down on the sand, in order to escape, if possible, the destruction which awaits them. Sometimes whole caravans have been absolutely buried in the sand which overwhelms them*.

If we go still further eastward, we find the elephant become a beast of burden. In India, and other oriental nations, a seat, called a *palanquin*, is placed upon the back of an elephant, or of two or more standing abreast; and in this palanquin are seated either warriors going to battle, or musicians, or monarchs and their ladies, according to the circumstances of the case. A cut of the Tartar palanquin, carrying a body of armed men, will be found in the first page of this paper.

Having now spoken briefly of the different animals employed as beasts of burden, we will proceed to speak of chairs or sedans, borne by men, the next step in land-travelling. There are many different specimens of the sedan, but we will proceed to describe the sedan or palanquin, employed by the Chinese.

The mode of travelling in China is greatly influenced by the number of rivers and canals which intersect it; this makes water-conveyance more convenient than land. But when that is impracticable, they travel, in the flat country round Pekin, in a one-horse tilted wagon, and, at some other parts, in chairs. The tilted wagons are much in disfavour among European visiters; the wheels, frequently solid and without spokes, are low, and fixed to very short axletrees. The bodies, covered with tilts of coarse cotton, open only in front, and are just wide enough to admit two persons closely wedged. They have no raised seats, and the only posture is, to be stretched at length, or with the legs drawn up, the traveller being always in close contact with the axle, without the intervention of springs.

The Chinese sometimes travel on horseback, but their best mode of journeying is in a sedan, of which Mr. Davis speaks in high terms. Upon the shoulders of two bearers are placed the poles, which are thin and elastic, and in shape something like the shafts of a gig connected near the end; and in this manner they proceed forward with a measured step, an almost imperceptible motion, and sometimes with considerable speed. Instead of panels, the sides and back of the chair consist of woollen cloth for the sake of lightness, with a covering of oil-cloth against rain. The front is closed by a hanging blind of the same materials, in lieu of a door, with a circular aperture of gauze to see through. "The Europeans at Macao," in the words of Mr. Davis, "furnish their sedans with Venetian blinds, and never make use of any other carriage. Private persons among the Chinese are restricted to two bearers, ordinary magistrates to four, and the viceroys to eight; while the emperor alone is great enough to require sixteen. They divide the weight by multiplying the number of shoulder-sticks applied to the poles, as represented in a vignette to Staunton's embassy, in an instance where the number of bearers would be sixteen; and this rule is made applicable to the conveyance of the heaviest burdens by *coolies*, or porters. The Chinese constantly remind one of ants, by the manner in which they conquer difficulties through dint of mere numbers; and they resemble those minute animals no less in their persevering and unconquerable industry."

In few countries are horses so little used for travelling as in China. The riders grudge the animals a sufficient amount of food, and they are consequently miserable, stunted creatures. The coolies, or porters, are much more employed, and are an honest, trustworthy class of men.

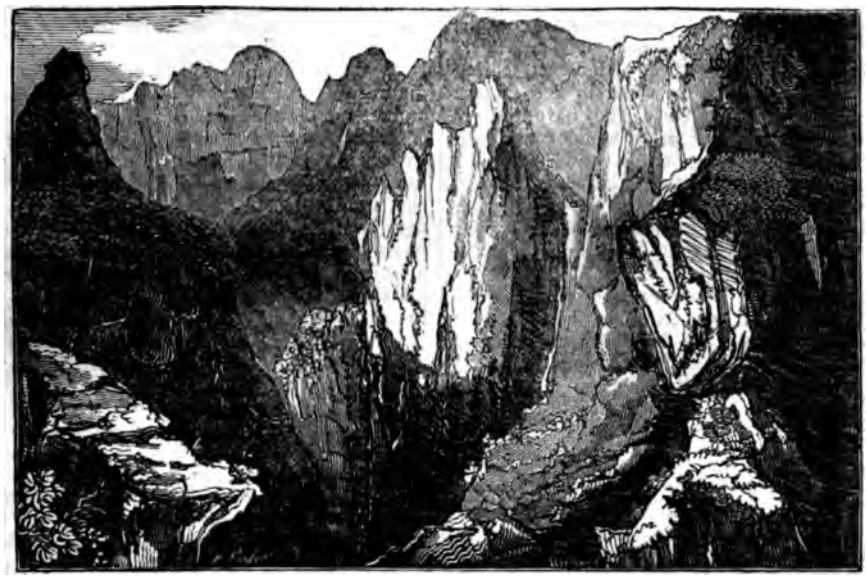
A kind of sedan is also used at Bahia, a city in Brazil, on account of many of the streets being too narrow to admit wheel-carriages through them; and in lieu of them the better class of inhabitants use *caderas*, which are a species of sedan. They consist of a cane arm-chair, with a foot-board and a canopy covered with leather; curtains, generally of moreen, with gilt bordering, and lined with cotton or linen, are contrived to draw round, or open at pleasure. The whole is slung by the top to a single pole, by which two negroes carry it at a quick pace upon their shoulders, changing occasionally from right to left. Sometimes a cotton hammock, with a canopy, is used instead.

The next step in the improvement of travelling, is to have a sedan or litter carried by mules, one before and one behind. This mode is adopted in Sicily, as represented in the annexed cut, and is very convenient on mountain-paths which are too narrow to admit of a wheel-carriage.

SICILIAN LITTER.

Another vehicle without wheels, is the sledge of the Russian, the Laplander, and the Kamtschadale. When the ground is covered deeply with snow, wheels would sink too far to be convenient, and the carriage therefore slides along the ground. The sledge of the Laplander is drawn by that valuable animal the *rein-deer*, which is capable of bearing great fatigue, and of travelling a long distance for several days in succession. The Kamtschadales employ

* *See a view and description of a Sand-storm in the Desert, at Vol. V., p. 33, of this Magazine.*



TRAVELLING IN THE ANDES.

s of a very powerful breed for this purpose. Those
s of Russia which are only covered with snow a small
ion of the year, are frequently traversed by sledges
wn by horses, as in the annexed cut.

RUSSIAN SLEDGE.

sledge of a kind altogether superior, is the Polish
e, as here represented.

POLISH CARIOLE.

nany advantages attend the use of vehicles with
at we cannot wonder at the variety and constant
nt in their construction. First, wheels were
a slice taken from the trunk of a tree; as is
the kingdom of Naples, in Italy:—then they
f different pieces fastened roughly together;
found that strength and lightness might be
y having spokes. As to the carriage itself,
g on the axletree might be the first form; then
ne-work resting on the shaft; then a tilt or
en an addition of two more wheels; and so on,
until we arrive at the heavy wagon, or the
of civilized life in our own day. Some of
hicles which we have here been describing,
used in countries which have now replaced
, and are still used in other countries at the
Thus, when Dr. Clarke travelled in Sweden
o, his accommodation was wretched in the
had to travel in what is called a *post-wagon;*
cart in England would be a state-carriage to
it. It consisted literally of nothing more than a pair o
wheels, with two shafts resting upon the axis. Upon the
shafts were lashed the trunk and other effects of the traveller,
and on them he was obliged to sit. Three persons, stationed
one behind the other, upon the baggage, and clinging fast
to one another, were deemed a sufficient burden for one
of these jolting machines; the foremost person of the three
holding the ropes which were used as reins, and driving a
single horse.

A considerable step in advance of this is the South American wagon, for here we find a tilted vehicle capable of sheltering a traveller or merchandise, although the animals which draw it are not remarkable for briskness of motion.

The wagon, drawn by oxen, is likewise the most general vehicle employed by the planters in South Africa. The missionaries, and other travellers who have proceeded northward from the Cape of Good Hope, generally adopt this mode of travelling; or if they themselves ride on horses, their baggage, provisions, &c., are conveyed in wagons, which are large and commodious, and fitted up with many accommodations.

The wagons and carriages of Chili, in South America, are fastened together without a single nail or piece of iron. The wheels have a double wooden felloe, placed so that the joints in the one are covered by the entire parts of the other, and these are fastened together by strong wooden pins; the rest is all of strong wooden frame-work, bound with hide, which, being put on green, contracts and hardens as it dries, and makes a very secure band. The flooring of both cart and coach consists of hide; the cart is tilted with canes and straw neatly wattled; the coach is commonly of painted canvass, nailed over a slight frame with seats on the sides, and the entrance behind. The coach is commonly drawn by a mule, though oxen are often used for the purpose; and always for the carts, yoked as for the plough. Oxen will travel ninety miles with a loaded wagon, in three days.

The Swedish vehicle at present in use, is, in appearance, something like what we should call a *van*, and is altogether superior to that which conveyed Dr. Clarke when he was in Sweden.

We must now go from wagons and carts to those which may be called *pleasure*-carriages.

The principal vehicle used in the streets of St. Petersburgh is that called the *drosky*. This is a very low four-wheeled carriage, the body of which is so near the ground, that the lower part of a rider's dress is apt to be either enveloped in dust, or covered with mud. It is, in fact, nothing more than a narrow bench, at the hinder part of which is a small back, about as high as the middle of a man's body, and against which he leans, sitting straddling across the bench, with his legs straight down on each side, like a soldier on horseback. If a second person be in the drosky, he sits on the same bench sideways, with nothing to rest his back against. In front of all is the driver, with his legs also across it, and separated from the person next to him by a small iron bar about six inches high.

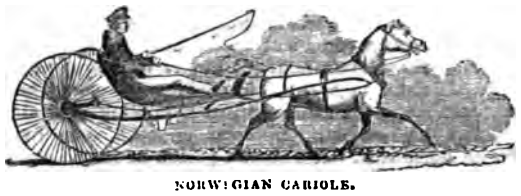
This is the shape both of the droskies belonging to private gentlemen, and of the public ones, which serve the purpose of our omnibuses, or hackney coaches. The drivers have a common livery, which consists of a blue coat, folding over the breast, and tied round the waist by a sash, the skirts hanging a little below the knees. They have trousers of large size, tucked inside their boots, which come half-way up the legs. They wear long beards, and have a tin plate fastened to the coat, on which their number is entered. Mr. Barrow describes these vehicles as being both unpleasant and dangerous, from the difficulty of the rider keeping himself packed on the bench which serves as a seat.

There are many vehicles in Europe, which, though used as pleasure-carriages, would, we fear, not have a very pleasant effect to the bones of an Englishman. One of these is the cart, or "car," used very frequently in the "sister-isle" for the conveyance of passengers.

IRISH JAUNTING CAR.

Let us therefore introduce our readers to the Irish jaunting car, which is of two kinds, the *outside* car, and the *inside* car. We will avail ourselves of Mr. Barrow's description. "An outside car then is this: a platform or floor of a few boards has two sides, which are raised up and down on hinges, raised, for no other use that I can see, except it be to grease the wheels. These sides are of canvass stretched on wooden frames, which drop from the edge of a seat, and have a foot-board at the bottom of the frame. The backs of the two seats form a narrow *well*, as it is termed, for the stowage of luggage in the centre, a name by no means inappropriate, as it is generally full of water when it rains, and when does it not in Ireland? The passengers, of course, sit back to back. If a single person hires it, the driver asks, 'Which side of the country would your honour like to see?' and, quitting his box, perches himself, very much at his ease, cross-legged, on the opposite side. But my objection to them is, that they are positively dangerous, inasmuch as the legs of the passenger, being outside the wheel, and totally unprotected, are liable to be struck and perhaps broken, through the carelessness of the driver, especially when he has posted himself as I have stated.

"If the car has its full fare of four persons, and the Hibernian Jehu must in that case keep to his stool, (alias coach-box,) it may happen that, twitching the mouth of his jaded beast by way of coaxing him into a trot, he pokes his elbow into his neighbour's face, with which it is just upon a level. With this number in going *up* hill, the whole weight of the front passenger falls upon him in the rear, which is by no means agreeable, particularly if he should chance to be a heavy one; and the same thing must happen to the front passenger in going *down* hill. If there be but *one* in the car, *up* hill he slips to the farthest end of the seat, and *down* hill he is involuntarily sent to the other extremity. Even on level ground he is ill at ease, as the points of the shafts are generally on a line, or nearly so, with the top of the horse's collar, and consequently it requires no little exertion to maintain his seat, and avoid these slips. My driver, however, made very light of these matters. 'Och! Your honour will aisily fall into the way of that.' 'Perhaps so, if I don't fall out of it.'"



NORWEGIAN CARIOLE.

A much better vehicle than this, is the *Cariole* of Norway. *A better idea of the Norwegian cariole* cannot be given than in the words of Mr. Laing. "After considering and consulting about my mode of travelling, I have to-day bought a second-hand cariole, for which, with harness, I have paid twenty-five dollars, or about 3*l.* 18*s.* The Norwegian cariole is a little gig, just large enough for one person, and resting between two low light wheels, upon two cross-bars of wood, morticed in the shafts. They are made also with iron springs; but I preferred the wood, as in travelling it can easily be got repaired, which iron-work cannot; besides, the shafts are so elastic, that the jolting is very slight on ordinary roads." The mode of travelling is curious. A few hours before starting, the traveller must send off a *forbud*, a little ragged urchin, who acts as courier. He precedes the traveller, with the luggage in the baggage-cart, and leaves at each post-station a printed notice, which the traveller has previously filled up, with the number of horses he will require, and the time of his arrival. The station-master sends notice to the neighbouring farmers, to provide the requisite number of horses, which are found ready at the appointed time. The hire of a horse for seven English miles is about 9½*d.*, and the station-master charges about 1½*d.* for his duties; so that travelling is very economical. To free the traveller from imposition, he states, in a book kept at each station, how he has been treated on the road; and these books are examined and signed regularly by the local authorities, and checked by superior officers of the district, and any complaint of undue delay is examined into.

Mr. Barrow's description agrees perfectly with the above.

The form of the cariole is so simple, that if any accident happen to it on the road, the peasants, who are generally handy at carpentry, can repair it. The owner of the horse, for any given distance, generally accompanies the traveller. "The carioles," says Mr. Barrow, "were generally accompanied either by men or boys, who ran along-side with extraordinary activity, jumping up occasionally, behind, to rest themselves. They ran with little apparent exertion to themselves, whenever the road was tolerably level; but as the country on the first part of our journey was ascending, sometimes up the steep sides of a mountain, they often had to walk the greater part of a stage. We had generally one man to each cariole, and another, who accompanied our servant's cart,—a rude kind of vehicle,—which we had to procure at the several post-stations, and which is, in fact, the machine which is commonly used by the *furbuds* whose name it bears."

Many fearful precipices are met with on the journey from Christiania to Bergen, in Norway. The traveller is surrounded on all sides by rocks of enormous height, rising almost perpendicularly from their base, while the sides of the mountains are covered with forests of dark-green fir-trees, which rear their lofty heads above each other, vying in height with the steep rocks, among which they are blended. The precipices, both above and below the narrow road, are frightful to contemplate; no precaution whatever is taken to prevent carriages from slipping off into the abyss below. In many places these precipices are perpendicular, and sometimes even inclined inwards. The road, too, is so narrow, as to be little more than barely sufficient to admit of the wheels of the carioles between the edge and the side of the mountain. "Had we happened," says Mr. Barrow, "to meet any other travellers here, (which was, fortunately, not very probable,) we should have been under the necessity of taking the horses out, and of lifting the carioles over each other. The chances, however, are against such a meeting, for not a single human being had hitherto appeared to us on this route. Oftentimes the road before us seemed to terminate altogether at the very brink of a precipice; when, on reaching the spot, it was found to turn sharply round; and these sharp turns, with the yawning gulf beneath, bring almost inevitable destruction, should the animal become restive, or an overturn unfortunately take place..... .....If the ascent of this mountain was found to be difficult, and somewhat dangerous, the descent was perfectly terrific: it was so steep that the horses were literally obliged to scramble down on their haunches."

The dreary parts of Southern Asiatic Russia, called the *steppes*, or great plains, are frequently traversed in small vehicles called *kibitkas*. These have been described as a kind of boat-shaped vehicle, somewhat resembling the half of a cask, sawed lengthwise, and mounted on wheels. They are about six feet long, four and a half broad, and three deep; they are lined with sheet-iron, and the outside ribbed like that of a boat. It has also a fixed hood of wood, covered with leather, and an apron of the last mentioned material.

It has no springs, and the axle-tree is of wood. Behind it is a large case as broad as the carriage, for the purpose of containing luggage.

We cannot afford space to describe all the varieties of vehicles used in foreign parts, nor is it necessary for us to do so, for differences between them are often very trivial in point of principle. Vehicles are very much dependent on the goodness of the road for the form given to them. Italy contains excellent roads: indeed there is no country in Europe in which land-travelling, at the present day, is so much influenced by the labours of the ancients in road-making, as Italy. The Romans, whether or not we admire the lust of conquest which distinguished them for so many ages, certainly laid us under deep obligations for the admirable roads which they constructed throughout the empire. In the Forum at Rome was erected a gilt pillar, on which was inscribed the distances of the great cities of the empire; and from that point several roads commenced, which were made as direct as possible, some being cut through hard rocks, and others carried over viaducts. They were sometimes paved with flag-stones, and at others constructed of vast blocks, neither hewn nor shaped by art, but fitted together in their original form. When hewn stones were used, they were cut out into large blocks of two, three, or even five feet square, and laid together without any cement, yet so firmly and closely connected, as to appear rather a continued rock than an artificial combination;—they have resisted both the influence of time, and the pressure of the enormous loads that have passed over them, in a manner altogether inconceivable. These magnificent roads were bordered on each side, near the imperial city, with rows, or rather streets of tombs; and thus, as Eustace observes, "The last object that a Roman beheld at his departure, and the first that struck him on his return, was the tomb of his ancestors."

The writer last quoted states, that the roads in Italy at the present day are good, the posts well furnished with horses, and robberies not common; travelling is therefore, in general, safe and expeditious; the principal, and indeed almost the only inconveniences, being from the equinoctial rains and the summer heats.

Italy is one of the countries which lay claim to the first introduction of carriages or coaches, and whether the claim be just or not, the Milanese carriage of the sixteenth century, represented in our first page, shows no small advance towards decoration. A modern Italian cabriolet, is a remarkably spirited looking affair, whether we regard the horses employed, the energy of the driver, or the careless ease of the riders.

Mr. Inglis informs us that there is only one road from Madrid to Seville, in Spain, but there are various modes of travelling it. Diligences, which leave Madrid twice a week, perform the journey in four days and a half, resting every evening from about seven to a little after midnight. *Galeras*, on springs, which have no regular day of departure, but which are to be found every week, perform the journey in ten days. A private coach and seven mules may be hired, by which eleven or twelve days will be occupied on the road; or this journey, like every other in Spain, may be performed by mules, and by this mode of conveyance fourteen days must be allowed. The better class of travellers from Bayonne to Madrid, in which the road is in good condition, are accommodated in a manner which Mr. Inglis thinks superior to anything else of the kind in Europe. "The coach is more commodious and roomy than an English private carriage; it is well cushioned and seated; the windows are furnished with Venetian blinds, by which the air may be admitted and the sun excluded, and by silk curtains, by which the sun may be excluded even when the glass-windows are closed; and two passengers only are admitted inside; another is admitted into the cabriolet along with the guard. The coach is drawn by four mules, which are kept at a gallop the whole way, up hill and down hill: and the road from Bayonne to Madrid is generally as smooth as the very best roads in England. I ascertained that the rate of travelling exceeded twelve miles an hour. No time is lost in useless stoppages; the mules are changed with as great expedition as in England. The traveller must be contented with few meals, and against the assaults of thirst the guards are provided with a well-filled wine-skin, to which they never apply without first offering it to the passengers, who are expected to accept the civility."

The same traveller speaks highly of the road which has been constructed across the Biscayan Mountains. The lower parts of the mountains are covered with oak and Spanish chestnut, and the summits rise to the height of at least 5000 feet, in the form of numerous fantastic pinnacles of a reddish colour; the road is constructed upon the most scientific principles, reaching the summit by a zigzag and very easy ascent, and is as broad and as smooth as the best roads in any other country.

In parts where no coaches can be met with open wagons, some with and some without springs, are let on hire to travellers.

In those countries of Europe which have made the greatest advance in civilization, there are vehicles let out for hire, besides those which belong to private individuals. Such are post-chaises, stage-coaches, diligences, omnibuses, &c. No other country is so well provided with these as England; but in France, Germany, Russia, and other parts of Europe, there are vehicles which answer more or less to this description. These public vehicles again admit of a subdivision into two classes; viz., those which may be hired at any time, and for any length of period: and those which perform stated journeys or stages. In Russia, for instance, the *droskies* are vehicles which can be hired at any time, and used by one or more persons who hire them. The public, or stage-coach conveyance, however, although it certainly exists, is in a very humble and meagre state indeed. The most important public road in Russia, that is, between its two capitals, St. Petersburg and Moscow, which are 460 miles asunder, is traversed by only one public vehicle, a clumsy and ill-built *diligence*, which starts but once a week. The journey occupies four days and three nights, and is extremely fatiguing, owing to the bad construction of the vehicle, and the incompleteness of part of the road. The seats are so ill arranged, that the passenger cannot sleep in comfort. "Almost broken backed," says Mr. Barrow, "suffocated with heat, smothered with dust, stung with mosquitoes, and nearly jolted to death over the rough roads, constructed of logs of wood,—all added to the misery of the position of the body, made it utterly impossible to get sleep during the night, and equally so to prevent the attempt at it; for there was a large leathern apron attached to a clumsy piece of wood, which fastened across the *coupé* about the height of the breast, against which the head (naturally inclined to nod,) would every now and then, by the assistance of a jolt, strike with such violence as to remind one, that it was actually necessary he should be indulged in no such luxury as the shutting his eyes."

When Dr. Clarke travelled over the *steppes*, or extended plains of the territory of the Don Cossacks, he was in a kind of post-chaise, which had a seat for two persons outside in front, and was drawn by six horses, two abreast as leaders, and four abreast as wheelers, with a horseman on one of the former, and a driver on a small box over the front wheels. A troop of Cossacks preceded the carriage, and others followed it, all armed with lances, twelve feet long. When the ground is covered with snow, this vehicle is taken off its wheels and placed on a sledge, the wheels being carried on another, and thus the traveller proceeds until the snows are melted.

The word *Germany* is so extensive in its signification, that German vehicles would comprise a very large number indeed. The Austrian capital, Vienna, is provided with the carriages of the wealthy in much abundance; and as we proceed northward, we pass through countries and provinces very different from Austria, although all are included with it in the general name of Germany. The wagons of the wholesale dealer, and the carts of the peasantry, are probably not very different from similar vehicles in England; but the carriages of the gentry are admitted to be inferior in that, as well as in every other country in Europe, to those of England; and the stage-coaches are manifestly inferior to English.

Mr. Russell, in his admirable *Tour in Germany*, gives an amusing description of the *post-wagen*, or German diligence. Much as we laugh at the meagre cattle, the knotted-rope harness, and lumbering paces of the French diligence, it is more neat, comfortable, and expeditious than that of Germany. The German carriage resembles the French one, but is still more clumsy and unwieldy. The luggage, which generally constitutes by far the greater part of the burden, is placed, not above, but in the rear. Behind the carriage, a flooring projects from above the axle of the hind-wheels, equal in length and breadth to all the rest of the vehicle. On this is built up a castle of boxes and packages, that generally shoots out beyond the wheels, and towers above the roof of the carriage. The whole weight is increased as much as possible by the strong chains intended to secure

the fortification from all attacks in the rear; for the guard, like his French brother, will expose himself neither to wind nor weather, but forthwith retires to doze in his cabriolet, leaving to its fate the edifice which has been reared with much labour and marvellous skill. Six passengers, if so many bold men can be found, are packed up inside: two, more happy, or less daring, take their place in the cabriolet, with the guard. The breath of life is insipid to a German, without the breath of his pipe. The "insides" puff most genially into each other's faces. With such an addition to the ordinary mail-coach miseries of a low roof, a perpendicular back, and scanty air-holes, the diligence becomes a very "Black Hole." To this huge mass, this combination of stage-coach and carrier's-cart, are yoked four meagre, ragged cattle, and the whole dashes along on the finest roads at the rate of rather more than three English miles an hour. The subject of refreshment is conducted with a very philanthropical degree of leisure, and at every considerable town a breach must be made in the luggage-castle, and built up again.

The French roads are better provided with vehicles than the German, but their roads are not so good. The French roads, canals, and harbours, are placed under the care of commissioners; but whatever other advantages may result from this arrangement, it has not provided the nation with good roads; for it is a general complaint among English travellers that they leave good roads behind them, and find bad ones in France. We lately alluded to a French diligence; we here give a description of one, of which a cut will be found on the first page of this paper.

After travelling in our smart, elegant, and rapid stage-coaches, an Englishman would form but a meagre opinion of a French diligence. It is a sort of compound of wagon and stage-coach. The inside is divided into two bodies, each holding four or six passengers, according to its size. In front is the *cabriolet* of the diligence, with leathern covers, like the cabs and chaises of England. The passengers in this part, usually three in number, constitute the outside fare; and even this is sometimes enclosed, and called the *coupé*. The inside-passengers have plenty of room, but from the smallness of the windows, and the manner in which the seats are arranged, a view of the surrounding country can scarcely be obtained. There is an arrangement about taking places, which would be often conveniently adopted in England; it is "first come, first served." When a place is taken, the passenger selects his seat from among those not yet occupied, and his name is affixed to it, which sufficiently secures the chosen seat to himself. Five or six horses generally draw the diligence, sometimes three abreast. The postilion sits on the near-shaft horse, and governs the leaders more by the sound of his voice, and of his long whip, than by the reins; and the average-rate at which the equipage travels, is about two leagues an hour, not more than half the rate of many of our stage-coaches.

We have now accompanied our readers in a ramble through most parts of the earth, to catch a glimpse of the various modes of travelling. It can, of course, only be a glimpse, and a transient one; but still we hope that it will be pleasant to the reader thus to find the means of judging how his fellow-men in foreign climes perform the journeys which business or pleasure marks out for them.

The vehicles of England will furnish an Englishman with abundant materials for another supplementary number of our Magazine.

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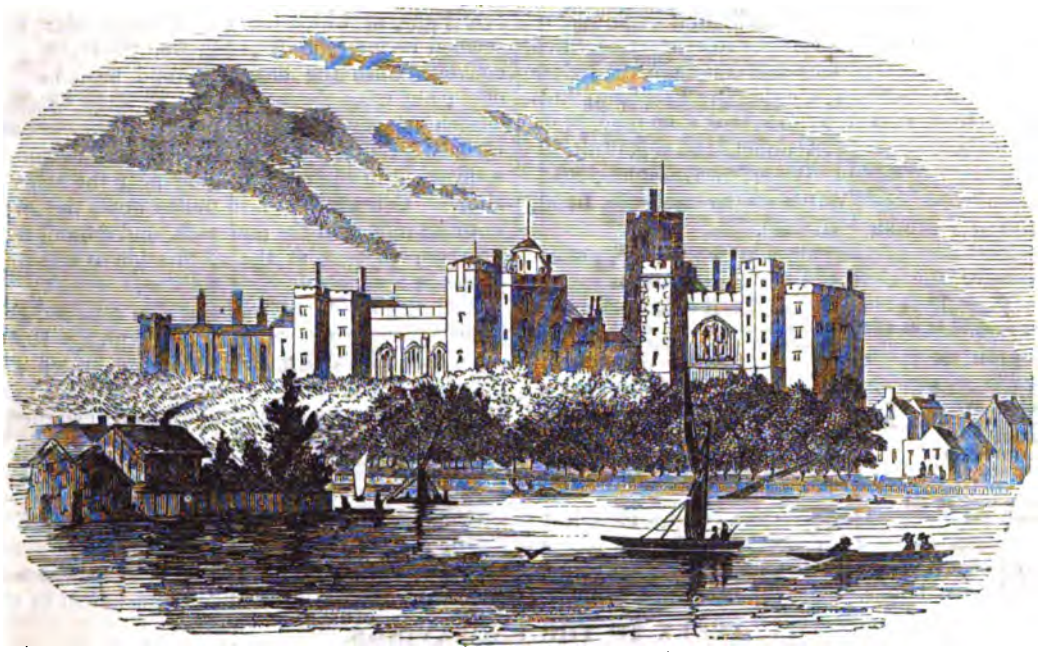
LAMBETH PALACE, AND ITS HISTORICAL ASSOCIATIONS. I.



VIEW OF LAMBETH PALACE.

LAMBETH PALACE possesses peculiar claims to the notice of a Protestant people, from having been, for several hundred years, the residence of the archbishops of Canterbury, the primates of England; each of whom is in possession of this palace, from the day on which he is appointed archbishop of Canterbury until his death: for as this is the highest office in the English Church, the divine who is appointed to it retains it till death, as further promotion in the Church is impossible. We propose to give a brief account of the origin of this ancient building, and the historical circumstances connected with it; as likewise a description of the principal objects which it contains, drawn from the histories of Ducarel, Deune, Herbert, Brayley, and others.

The first archbishop of Canterbury was St. Austin, or Augustin. He was originally a monk in the convent of St. Andrew at Rome, and educated under St. Gregory, afterwards Pope Gregory the First, by whom he was sent into Britain, with forty other monks, about the year 596, to convert the English to christianity. The missionaries landed in the isle of Thanet, and having sent some French interpreters to King Ethelbert, with an account of their errand, the king gave them leave to convert so many of his subjects as they could, and assigned Canterbury as their place of residence, where they by degrees converted the king himself and many of his subjects. Augustin despatched messengers to Rome, to inform the pope of his proceedings, and the pope sent back a pall, and several books, vestments, utensils, and ornaments for churches; and at the same time sent orders to St. Augustin as to what course he should pursue about appointing bishops, converting idol temples into Christian churches, in order not to shock the feelings of the natives, by pulling down their places of heathen worship, &c. A church and a residence were built by the king for Augustin at Canterbury; and it thus became the nucleus from which Christianity spread through England.

Canterbury continued to be the residence of the archbishop for several centuries; every successive occupant of the see adding something to the completeness of the cathedral, or of the archiepiscopal residence. It appears that the parish of Lambeth was a royal manor; for the Saxon kings had a residence there, and Hardicanute died there in 1042, amid the festivities of a wedding dinner. Harold, the son of Earl Godwyn, likewise resided at Lambeth, on his resumption of the crown, after the death of Edward the Confessor. The manor was afterwards transferred to the bishopric of Rochester, and some part of its revenues appears to have been appropriated to the maintenance of the monks belonging to that see. At a later period there was a dispute between the bishop and monks of Rochester, as to who were entitled to the revenues derived from the manor of Lambeth; and by the arbitration of parties to whom the matter was referred, it was decided in favour of the monks.

In the year 1189, in the reign of Richard the First, Baldwin, archbishop of Canterbury, and Gilbert de Glanville, bishop of Rochester, made an exchange of lands belonging to their sees, by which part of Lambeth manor became the property of the archbishop; and eight years afterwards the whole manor became attached to the archiepiscopal see, and archbishop Hubert Walter took up his residence there. For the

long period of six hundred and forty years, therefore, Lambeth has been the residence of the archbishops of Canterbury.

There are no means of knowing, at the present day, what sort of a palace then existed at Lambeth; though it appears to have been but little else than a good-sized mansion-house or manor-house. In 1262, the house and chapel having been much dilapidated, Archbishop Boniface obtained a bull from Pope Urban the Fourth, to allow him to devote one-fourth of the offerings made at the tomb of Thomas-à-Becket to the rebuilding or repairing of the Lambeth residence; and it is supposed that this was the first beginning of the present palace. From century to century repeated improvements and additions were made in the palace by the different archbishops, especially Peckham, Sudbury, Bourchier, Parker, Winchelsey, Courtney, Morton, Grindall, Reynolds, Arundel, Deane, Whitgift, Islip, Chichely, Warham, Bancroft, Langham, Stafford, Cranmer, Abbott, Wittlesey, Kemp, Pole, Laud, and those of more modern date.

The oldest part of the palace seems to be the stone arches under the chapel, now turned into vaults. By the year 1321 it appears as if some advance towards completeness had been made; for in the steward's account of the expences, mention is made of the following component parts of the palace:—*The Great Chapel, My Lord's Chamber, Chamber near the Hall, Wardrobe near the Chapel, another Wardrobe, Kitchen, Bakehouse, Great Gate at the Entrance, Poultry-room, Wharf, Mill near the Postern.*

During Wat Tyler's insurrection, in 1381, a lawless mob attacked the palace, and ransacked and burned all that they could lay their hands on, in the shape of goods, books, registers, &c.; which caused the two succeeding archbishops not a little expense to repair the damage.

Archbishop Chichely was one of the greatest benefactors to the palace; for we find mention, in registers of expences for repairs, &c., of the following parts, in addition to those before given:—*The Great Chamber, the Little Chamber, Study, Parlour, Great Hall and Porch, Steward's Chamber, Steward of the Household's Chamber, Auditor's Chamber, Registry, Register's Chamber, Guard Chamber, Archbishop's Oratory, Great Oratory, Clerk of the Kitchen's Apartment, Cook's Room, Chauntry, Ewry adjoining the Chapel, Storehouse, Pantry, Larder, Fountain or Aqueduct in the Kitchen, Great Cloister, Little Cloister,* &c. He also built the Lollard's Tower, of which we shall have more to say hereafter.

During the wars between the houses of York and Lancaster, Lambeth palace suffered considerable injury, which caused Archbishop Morton to repair and rebuild a great part of it, particularly the great tower near the gateway, and the gateway itself about the year 1490. Archbishop Cranmer built the great parlour, now called the Steward's parlour. About the year 1570, Archbishop Parker greatly repaired and beautified it. He covered the Great Hall with shingles; he made a long bridge that reached to the Thames; he restored a very beautiful summer-house in the garden, which had been built by Cranmer; he improved two aqueducts for the conveyance of water from the Thames to the garden to the domestic apartments.

When Archbishop Laud held the see, the palace was injured by the civil commotions of the times. In his diary are the following entries:—"1642. Aug. 19—A party of soldiers came to search for arms, and under that pretence broke open doors, and committed other outrages. Nov. 24, the soldiers broke open the chapel door, and offered violence to the organ. 1643, May 1, the chapel windows were defaced, and the steps torn up. May 9, all the archbishop's goods and books were seized on, and even his very diary taken by force out of his pocket." After the execution of Charles the First, Lambeth palace fell to the lot of Colonel Scot, one of the regicides, who, in order to turn the chapel into a hall or dancing-room, levelled the raised monument of Archbishop Parker. Dart says, "Because the tomb of the venerable Archbishop Parker stared them in the face, and checked their mirth, it was broken to pieces, his bones dug up by Hardynge, to whose share this part of the palace fell; and opening the leaden coffin, and cutting away the cerecloths, of which there were many folds, the flesh seemed very fresh. The corpse, thus stripped, was conveyed into the outhouse, and buried among the offal; but upon the restoration of King Charles, that wretch Hardynge was forced to discover where it was: whereupon the archbishop had him honourably re-interred in the same chapel, near the steps of the altar." Colonel Scot also pulled down the large hall, to make money of the materials, and committed other ravages; so that at the restoration it was in many places in a very ruinous condition.

Archbishops Juxon and Sheldon repaired these injuries by degrees, the former expending 10,500*l.* in rebuilding the Great Hall. The celebrated Tillotson expended 8000*l.* in the short space of three years and a half, in rendering the palace more complete in its various departments, and Secker, the author of the well-known *Lectures*, expended large sums in roofing, flooring, painting, and glazing almost every part of the edifice. Archbishop Cornwallis, who possessed a good deal of elegant taste, added some convenient and splendid apartments to those which before existed, and embanked and walled in the garden next the Thames.

Such were the gradual steps by which Lambeth palace assumed the form and extent which we now find it to possess, and which are represented in our frontispiece. Before we proceed to describe the most remarkable objects presented within the building, we will speak of various circumstances connected with the occupancy of this palace by the archbishops of Canterbury.

The archbishops had, long since, a ferry-boat at Lambeth, the profits of which they granted, by patent, to some of their officers. They received annually for many years, only twenty pence, but it was afterwards increased to ten pounds. Upon the finishing of Westminster bridge, in November 1750, the ferry-boat ceased by act of parliament, and an equivalent was given to the see of Canterbury for the same; and likewise to Mr Folkes, the surviving patentee, for his interest in the same.

In the year 1800, a correspondent of the *Gentleman's Magazine* furnishes an account of the origin of the visit of the barge, belonging to the Company of Stationers, to Lambeth stairs. The account is as follows:—

On the annual aquatic procession of Lord Mayor of London to Westminster, the barge of the Company of Stationers, which is usually the first in the show, proceeds to Lambeth Palace, where they receive a present of sixteen bottles of the archbishop's prime wine. This custom originated at the beginning of the eighteenth century. When Archbishop Tenison enjoyed the see, a near relation of his, who happened to be master of the Stationers' Company, thought it a compliment to call there in full state, and in his barge. When the archbishop was informed that the number of the company in the barge was thirty-two, he thought that a pint of wine for each would not be disagreeable, and ordered at the same time that a sufficient quantity of new bread and old cheese, with plenty of strong ale, should be given to the watermen and attendants; and, from that accidental circumstance, it has grown into a settled custom. The com-

pany, in return, present to the archbishop a copy of the several almanacs which they have the peculiar privilege of publishing.

Archbishop Parker, in the reign of Queen Elizabeth, gained much good-will by the mild and Christian-like manner in which he treated two Catholic bishops, who were placed, as prisoners, in his hands. He provided them and their servants with comfortable apartments, and diet fitted to their rank in society. Sometimes they dined at the archbishop's own table at the palace, and at other times were provided with fuel and candles, and all other necessaries, in their own apartments. The circumstance which renders this worthy of record is, that the archbishop had no allowance for this purpose, either from the queen, or from the prisoners themselves.

The events which have occurred at Lambeth palace, from age to age, have been very faithfully handed down to us; and among them are several visits from the British sovereigns to the archbishops of Canterbury at the palace. Catherine of Arragon, queen of Henry the Eighth, "was lodged for some days at the archbishop's inne at Lambeth," on her first arrival in England from Spain. Henry the Eighth visited Archbishop Warham at Lambeth; and Queen Mary is said to have completely furnished Lambeth palace, for the reception of Cardinal Pole, at her own expense, and to have frequently honoured him with her company. On one of the visits of Queen Elizabeth to Archbishop Parker, after having been magnificently entertained, she is said to have thanked Mrs. Parker, the archbishop's lady, in the following uncourtly strain:—"And you, *Madam* I may not call you, and *Mistress* I am ashamed to call you, so as I know not what to call you; but nevertheless I thank you."

Lambeth palace was placed in some jeopardy during the disturbances which disgraced the metropolis in 1780. A mob of five hundred persons came to the palace with drums and fifes, and colours flying. Finding the gates shut, after knocking several times without obtaining any answer, they shouted out that they would return in the evening, and paraded round the palace all that day. Upon this alarm it was thought necessary to apply to the secretary-at-war for a party of soldiers. Accordingly a party of the guards, amounting to one hundred, commanded by Colonel Deacon, arrived at two o'clock in the afternoon, when centinels were immediately placed upon the towers of the palace, and at every avenue. The mob for several days continued to surround the palace, notwithstanding the presence of the soldiers. In this alarming situation Archbishop Cornwallis, with his lady and family, were with great difficulty prevailed upon to quit the palace, to which they did not return till the disturbances had entirely ceased.

From June the 6th to August the 11th troops were constantly in the palace, one corps being succeeded by another; there being sometimes two and even three hundred soldiers in the palace at once. The two chaplains did the honours of the palace during this period, entertaining the officers in the best apartments, and the soldiers, with their wives and families in the Great Hall. All the troops attended divine service twice a day, while in the palace. On the 11th of August it was deemed safe to remove the troops.

Three years afterwards a robbery was committed at the palace which made a great sensation. A closet containing the plate was bricked up during some repairs that were going on. These bricks were pulled down, and 3000*l.* worth of plate carried off. Some time afterwards some boatmen, late one evening, heard a hammering and tinkling, near the banks of the river, in a timber-yard. This proved to be the thieves beating up the articles of plate, for the purpose of selling them. They had concealed the plate in a large drain, and used to come at night and fetch it, a piece at a time, as fast as they were able to sell it; for this occurred several months after the robbery. One of the robbers was caught and convicted, but the rest escaped to Holland.

We have thus collected, from different sources, various particulars relating to Lambeth palace generally, and we shall, in future numbers, conduct our readers through the most notable and interesting parts of the interior of the palace, which is connected with much that is remarkable in antiquities, in religion, in history, and in literature generally

ON THE INTRODUCTION OF SADDLES AND STIRRUPS.

From the moment when men began to appreciate the value of a horse as a beast of burden, it is natural to suppose that they turned their thoughts towards the best modes of attaching the burden to the animal; and as, perhaps, the most important of such burdens is man himself, the purposes to which the saddle and the stirrup are now applied must have soon attracted the attention of the rider. In this, as in most other cases, improvements and inventions have been gradual and far between. Pliny gives the honour of having introduced the use of saddles to one Pelethronius, but who he was is not known.

Among the Greeks and Romans saddles of various kinds were known, but it was considered more manly to ride without their aid; and Xenophon reproaches the Persians because they placed more clothes on the backs of their horses than on their beds, and gave themselves more trouble to sit easily than to ride skilfully. It was stated by one writer that coverings were first allowed to the horses of the Roman cavalry by Nero. But it is supposed that this only alluded to the time when they were being reviewed: before Nero's time, the men were obliged to produce their horses, at review, without any covering, to afford means of observing whether they were in good condition; but Nero ordered them to be adorned with their trappings, in order to make a grander appearance.

But it is most probable that the coverings hitherto alluded to, came more under the name of cloths than of saddles. Beckman thinks that saddles, properly so called, were invented about the middle of the fourteenth century; although for many ages prior to that time, the horse-cloths assumed more or less the form and purpose of saddles. That something rather ponderous was meant when the word saddle, or *sella*, was used, may be inferred from an order of the Emperor Theodosius in 385, by which those who wished to ride post-horses were forbidden to use saddles that weighed more than sixty pounds; if a saddle heavier than this were found it was to be cut to pieces. In the fifth century saddles were decorated with such magnificence, that a prohibition was issued by the Emperor Leo the First, in which it was ordered that no one should ornament them with pearls or precious stones. In the following century, there was an order from the Emperor Mauritius, requiring that the saddles of the cavalry should have large coverings of fur.

That something like saddles were in use among the Greeks seems to be shown by a passage in Arrian, where he says that saddles were not in use among the Indians, and that they had no bridles made after the fashion of the Greeks and Celts; but, instead of

them, they governed and guided their horses with a thong, or strap, cut from the raw hide of a bull.

Whether Beckman's suggestion respecting the date of the introduction of saddles be correct or not, it is very certain that they were by no means common at that period. It is said, that when Richard the Second went to Ireland in 1399 to chastise Mac Mourrough for assuming the title of King of Ireland, Mac Mourrough descended from a neighbouring mountain mounted on a horse without a saddle.

Stirrups, though so much used with saddles at the present day, are by no means inseparable from them either in origin or in construction. Their uses are two-fold,—to assist the rider in vaulting into the saddle, and (the more important of the two) to ease the legs of the rider. These rests for the feet give a firmness and stability to the position of the rider which he would not otherwise have. The length of the stirrup-leather, as it regulates the position of the legs, is by no means an unimportant matter. A writer on horsemanship, in the *Encyclopædia Britannica*, says,—

It was well observed by Don Quixote, in one of his lectures to Sancho, that the seat on a horse makes some people look like gentlemen and others like grooms. But a wonderful improvement has taken place within the last half-century in the seat on horseback, of all descriptions of persons, and effected chiefly by the simple act of giving the rider a few more inches of stirrup-leather. No gentleman now, and very few servants, are to be seen with short stirrups, and consequently, with a bent knee, which, independent of its unsightliness, causes uneasiness to the horse as well as to his rider, whose knees being lifted above the skirts of the saddle, deprive him of the assistance of the clip, by the thighs and legs. The short stirrup-leather, however, was adopted with the idea of its giving relief to the horse, although a moment's consideration would have proved the contrary.

The introduction of stirrups was certainly much later than that of the richly-decorated saddles of which we have spoken. The ancient coins, which contain representations of men on horseback, rarely give any indications of the use of stirrups. Hippocrates and Galen speak of a disease which was much prevalent among horsemen in their time, occasioned by the legs hanging down unsupported during long and fatiguing journeys. It is said that Germanicus, the father of Caligula, used to take exercise on horseback every day after dinner, as a remedy for weakness in his ancles; and the mode in which the operation of this remedy was effected, was thus explained, —that by riding without stirrups or any other support for the legs, they were continually swinging backwards and forwards, and thus drove the blood in rapid circulation to the feet and ancles.

The convenience of the rider, when on horseback, is, as we have said, only one of the uses which stirrups are calculated to render; another being their assistance while mounting the horse. The customs prevalent among the Romans required, that young and expert riders should be able to vault on horseback without any assistance. In order to habituate them to this exercise, there were wooden horses in the Campus Martius, on which practitioners were obliged to mount and dismount, both on the right and the left side, at first unarmed, and then with arms in their hands. Stones were erected in many places, such as highways, to which a rider could lead his horse, in order to mount with more facility. Such stones as these were very frequent in many of the German and Italian towns, two or three centuries ago, especially near the council-houses and town-halls, that they might be used by the town-councillors, who at that time were not accustomed to the luxury of coaches. Similar stones are not unfrequent in many parts of England likewise.

It was however a point of dignity among the high and wealthy, to keep servants ready to assist them in mounting. Sometimes also portable chairs or stools were at hand, on which the rider might step. This was the first germ of the insulting practice, which was afterwards introduced, of making the vanquished a footstool for the victor. In this manner was the emperor Valerian treated by Sapor, king of Persia. Many similar instances are recorded in history, and in the ages of superstition and mental debasement, emphatically called the "dark ages," the clergy often carried their boundless pride to such an extent as,— not perhaps to make kings and princes their footstools, but to make them hold the stirrups of the horse which the cardinal or legate was about to mount.

It is supposed, as far as the means now remain of determining it, that the earliest account of stirrups is in a book on the *Art of War*, by Mauritius, written about the sixth century. He says that a horseman must have at his saddle two iron *scalæ*, which are supposed to mean stirrups. In another part he says that the *deputati*, who were obliged to carry the wounded horsemen from the field, ought to have two stirrups on the left side of the horse, one at the fore-part and the other at the hind-part of the saddle-tree, that they might each take a disabled soldier on horseback behind them.

From the time that saddles and stirrups became a general part of an equestrian equipage, the changes and improvements in their form and construction have not been so numerous and important, as in many other parts of a traveller's conveniences. The saddle is chiefly employed to furnish a softer seat for the rider than the bare back of the horse would afford, and is, in fact, little more than a padded cushion: but Mr. Marsh has lately introduced the use of fine wire springs, instead of pads, which are said to prove very elastic and convenient. The springs are of the kind used for elastic braces, and other similar articles, and are extended in rows from the front to the back of the saddle, where they are fastened down to the interior substance of the saddle. As the motion of the rider tends to press down these springs laterally, their elasticity resists the pressure, and gives a gentle undulatory movement, which is said by the inventor to be more agreeable to the rider than that afforded by the ordinary saddles. The latest improvement in the construction of saddles has been to form the seat of india-rubber, the inflation of which converts it into an air-cushion, which is described as being delightfully pleasant to the rider, and easy to the horse.

THE WORKS OF CREATION.

I PRAISED the earth, in beauty seen,
With garlands gay of various green:
I praised the sea, whose ample field
Shone glorious as a silver shield;
And earth and ocean seemed to say,
"Our beauties are but for to-day."
I praised the sun, whose chariot rolled
On wheels of amber and of gold;
I praised the moon, whose softer eye
Gleamed sweetly through the summer sky;
And moon and sun in answer said,
"Our days of light are numbered."
O God! O good beyond compare!
If thus thy meaner works are fair,
If thus thy beauties gild the span
Of ruined earth and sinful man,
How glorious must the mansion be
Where thy redeemed shall dwell with thee!

BISHOP HEBER.

FROM CORREGIO'S PICTURE OF MAN, THE SLAVE OF LICENTIOUSNESS.

THE CONFESSIONS OF A DRUNKARD.

Twelve years ago I had completed my six and twentieth year. I had lived from the period of leaving school to that time, pretty much in solitude. My companions were chiefly books, or at most, one or two living ones of my own book-loving and sober stamp. I rose early, went to bed betimes, and the faculties which God had given me, I have reason to think, did not rest in me unused.

About that time I fell in with some companions of a different order. They were men of boisterous spirits, sitters-up at nights, disputants, drunken, yet seemed to have something noble about them. We dealt about the wit, or what passes for it, after midnight, jovially. Of the quality called fancy, I certainly possessed a larger share than my companions. Encouraged by their applause, I set up for a professed joker! I, who of all men least fitted for such an occupation, having, in addition to the greatest difficulty which I experienced at all times of finding words to express my meaning, a natural nervous impediment in my speech.

Reader, if you are gifted with nerves like mine, aspire to any character but that of a wit. When you find a tickling relish upon your tongue disposing you to that sort of conversation, especially if you find a preternatural flow of ideas setting in upon you at the sight of a bottle and fresh glasses, avoid giving way to it, as you would fly your greatest destruction. If you cannot crush the power of fancy, or that within you which you mistake for such, divert it, give it some other play. Write an essay, pen a character or description,—but not as I do now, with tears trickling down your cheeks.

To be an object of compassion to friends, of derision to foes; to be suspected by strangers, stared at by fools; to be esteemed dull when you cannot be witty, to be applauded for witty when you know that you have been dull; to be called upon for the extemporaneous exercise of that faculty which no premeditation can give; to be spurred on to efforts which end in contempt; to be set on to provoke mirth, which procures the procurer hatred; to give pleasure and be paid with squinting malice; to swallow draughts of life-destroying wine which are to be distilled into airy breath, to tickle vain auditors; to mortgage miserable morrows for nights of madness; to waste whole seas of time upon those who pay it back in little inconsiderable drops of grudging applause,—are the wages of buffoonery and death.

Time, which has a sure stroke at dissolving all connexions which have no solider fastening than this liquid cement, more kind to me than my own taste or penetration, at length opened my eyes to the supposed qualities of my first friends. No trace of them is left but in the vices which they introduced, and the habits they infixed. In them, my friends survive still, and exercise ample retribution for any supposed infidelity that I may have been guilty of towards them.

My next more immediate companions were, and are, persons of such intrinsic and felt worth, that, though accidentally their acquaintance has proved pernicious to me, I do not know that, if the thing were to do over again, I should have the courage to eschew the mischief at the price of forfeiting the benefit. I came to them reeking from the steams of

my late overheated notions of companionship; and the slightest fuel which they unconsciously afforded, was sufficient to feed my old fires into a propensity.

They were no drinkers, but, one from professional habits, and another from a custom derived from his father, smoked tobacco. The devil could not have devised a more subtle trap to re-take a back-sliding penitent. The transition, from gulping down draughts of liquid fire to puffing out innocuous blasts of dry smoke, was so like cheating him. But he puts the trick upon us of two for one. That (comparatively) white devil of tobacco brought with him, in the end, seven worse than himself.

It were impertinent to carry the reader through all the processes by which, from smoking at first with malt liquor, I took my degrees through their wines, through stronger wine and water, through small punch, to those juggling compositions, which, under the name of mixed liquors, slur a great deal of brandy or other poison, under less and less water continually, until they come next to none, and so to none at all. But it is hateful to disclose the secrets of my Tartarus.

I should repel my readers, from a mere incapacity of believing me, were I to tell them what tobacco has been to me, the drudging service which I have paid, the slavery which I have bowed to it:—how, when I have resolved to quit it, a feeling as of ingratitude has started up:—how it has put on personal claims, and made the demands of a friend upon me:—how the reading of it casually in a book,—as where Adams takes his whiff in the chimney-corner of some inn, in *Joseph Andrews*; or Piscator, in the *Complete Angler*, breaks his fast upon a morning pipe in that delicate room, *Piscatoribus Sacrum*,—has, in a moment, broken down the resistance of weeks:—how a pipe was ever in my midnight path before me, till the vision forced me to realize it:—how, then, its ascending vapours curled, its fragrance lulled, and the thousand delicious ministerings conversant about it, employing every faculty, extracted the sense of pain:—how, from illuminating, it came to darken; from a quick solace, it turned to a negative relief: thence to a restlessness and dissatisfaction: thence to a positive misery:—how, even now, when the whole secret stands confessed in all its dreadful truth before me, I feel myself linked to it beyond the power of revocation. Bone of my bone—

Persons not accustomed to examine the motives of their actions, to reckon up the countless nails that rivet the chains of habit, or, perhaps, being bound by none so obdurate as those I have confessed to, may recoil from this as from an overcharged picture. But what short of such a bondage is it, which, in spite of protesting friends, a weeping wife, and a reprobating world, chains down many a poor fellow, of no original indisposition to goodness, to his pipe and his pot?

I have seen a print, after Correggio, in which three female figures are ministering to a man, who sits fast bound at the foot of a tree. Sensuality is soothing him, Evil-habit is nailing him to a branch, and Repugnance, at the same instant of time, is applying a snake to his side. In his face is feeble delight, the recollection of past, rather than perception of present pleasures; languid enjoyment of evil, with utter imbecility to good; a sybaritic effeminacy; a submission to bondage; the springs of the will gone down like a broken clock; the sin and the suffering co-instantaneous, or the latter forerunning the former; remorse preceding action—all this represented in one point of time.—When I saw this, I admired the wonderful skill of the painter. But, when I went away, I wept, because I thought of my own condition.

Of *that* there is no hope that it should ever change. The waters have gone over me. But out of the black depths, could I be heard, I would cry out to all those who have but set a foot in the perilous flood. Could the youth, to whom the flavour of his first wine is delicious as the opening scenes of life, on the entering upon some newly discovered paradise, look into my desolation, and be made to understand what a dreary thing it is, when a man shall feel himself going down a precipice with open eyes, and a passive will,—to see his destruction, and have no power to stop it, and yet to feel it all the way emanating from himself; to perceive all goodness emptied out of him, and yet not to be able to forget a time when it was otherwise; to bear about the piteous spectacle of his own self-ruins;—could he see my fevered eye, feverish with last night's drinking, and feverishly looking for this night's repetition of the folly; could he feel the body of the death out of which I cry hourly with feebler and feebler outcry to be delivered,—it were enough to make him dash the sparkling beverage to the earth, in all the pride of its mantling temptation, to make him clasp his teeth,

> And not undo 'em,
> To suffer WET DAMNATION to run thro' e'm.

Yea, but (methinks I hear somebody object) if sobriety be that fine thing you would have me to understand, if the comforts of a cool brain are to be preferred to that state of heated excitement which you describe and deplore, what hinders in your own instance that you do not return to those habits from which you would induce others never to swerve? If the blessing be worth preserving, is it not worth recovering?

Recovering!—Oh! if a wish could transport me back to those days of youth, when a draught from the next clear spring could slake any heats which Summer suns and youthful exercise had power to stir up in the blood; how gladly would I return to thee, pure element, the drink of children, and of child-like holy hermits. In my dreams I can sometimes fancy thy cool refreshment purling over my burning tongue. But my waking stomach rejects it. That which refreshes innocence only makes me sick and faint.

But is there no middle-way betwixt total abstinence and the excess which kills you?—For your sake, reader, and that you may never attain to my experience, with pain I must utter the dreadful truth, that there is none, none that I can find. In my stage of habit, (I speak not of habits less confirmed—for some of them, I believe, the advice to be most prudential,) in the stage which I have reached, to stop short of that measure which is sufficient to draw on torpor and sleep, the benumbing apoplectic sleep of the drunkard is to have taken none at all. The pain of the self-denial is all one. And what that is I had rather the reader should believe on my credit, than know from his own trial. He will come to know it, whenever he shall arrive in that state, in which, paradoxical as it may appear, *reason shall only visit him through intoxication:* for it is a fearful truth, that the intellectual faculties, by repeated acts of intemperance, may be driven from their orderly sphere of action, their clear day-light ministeries, until they shall be brought at last to depend, for the faint manifestation of their departing energies, upon the returning periods of the fatal madness to which they owe their devastation. The drinking-man is never less himself than during his sober intervals. Evil is so far his good.

Behold me then, in the robust period of life, reduced to imbecility and decay. Hear me count my gains, and the profits which I have derived from the midnight cup.

Twelve years ago, I was possessed of a healthy frame of mind and body. I was never strong, but I think my constitution was as happily exempt from the tendency to any malady as it was possible to be. I scarce knew what it was to ail anything. Now, except when I am losing myself in a sea of drink, I am never free from those uneasy sensations in head and stomach, which are so much worse to bear than any definite pains or aches.

At that time I was seldom in bed after six in the morning, Summer and Winter. I awoke refreshed, and seldom without some merry thoughts in my head, or some piece of a song to welcome the new-born day. Now, the first feeling which besets me, after stretching out the hours of recumbence to their last possible extent, is a forecast of the wearisome day that lies before me, with a secret wish that I could have lain on still, or never awaked.

Life itself, my waking life, has much of the confusion, the trouble, and obscure perplexity of an ill dream. In the day-time I stumble upon dark mountains.

Business, which, though never particularly adapted to my nature, yet as something of necessity to be gone through, and therefore best undertaken with cheerfulness, I used to enter upon with some degree of alacrity, now wearies, affrights, perplexes me. I fancy all sorts of discouragements, and am ready to give up an occupation which gives me bread, from a harassing conceit of incapacity. The slightest commission given me by a friend, or any small duty which I have to perform for myself, as giving orders to a tradesman, &c., haunts me as a labour impossible to be gone through. So much the springs of action are broken!

The same cowardice attends me in all my intercourse with mankind. I dare not promise that a friend's honour, or his cause, would be safe in my keeping, if I were put to the expence of any manly resolution in defending it. So much the springs of moral action are deadened within me!

My favourite occupations in times past now cease to entertain. I can do nothing readily. Application, for ever so short a time, kills me. This poor abstract of my condition was penned at long intervals, with scarcely any attempt at connexion of thought, which is now difficult to me.

The noble passages which formerly delighted me in history or poetic fiction, now only draw a few weak tears, allied to dotage. My broken and dispirited nature seems to sink before anything great and admirable.

I perpetually catch myself in tears, for any cause, or none. It is inexpressible how much this infirmity adds to a sense of shame, and a general feeling of deterioration.

These are some of the instances, concerning which, I can say with truth, that it was not always so with me.

Shall I lift up the veil of my weakness any further, or is this disclosure sufficient?

I am a poor nameless egotist, who have no vanity to consult by these confessions. I know not whether I shall be laughed at, or heard seriously. Such as they are, I commend them to the reader's attention, if he find his own case any way touched. I have told him what I am come to. Let him stop in time.

CHARLES LAMB.

THE education of the human mind commences in the cradle; and the impressions received there frequently exert their influence through the whole of life. Principles which take the deepest root, are those implanted during the seasons of infancy, childhood, and youth. The young pupil takes early lessons from everything around him; his *character* and *habits* are forming before he has any consciousness of his reasoning powers.—COGAN.

THE BUCCANEERS OF AMERICA.

IN the history of nations, there are many instances which occur to the reader, of a fervour or enthusiasm which makes some particular mode of life highly in favour among daring and fearless spirits. Such was the case with the Buccaneers, a class of men, who, sprung up through manifest injustice, gained thereby the sympathy of kindred spirits, and afterwards obtained great power and influence.

The Spaniards, after they had discovered the West Indies, displayed great jealousy against the natives of any other nation who wished to visit the islands,—from a desire of preserving all the good things to themselves: indeed a bull of Pope Alexander the Sixth acknowledged Spain as the sole mistress of the New World. Every foreigner found on any of the islands, therefore, was treated as a robber or smuggler, pursued like a wild beast, and murdered in cold blood. It is not wonderful that a spirit of self-defence sprang up against this tyranny, or that foreigners should combine for mutual assistance. In 1517 an English ship appeared off St. Domingo, and requested liberty to trade: the answer was a shower of shot, which sent her away; and the Spanish Government reprimanded the Governor for not having seized the ship and murdered the crew.

But the New World was looked upon as a mine of wealth, and English and French adventurers resolved to brave Spanish rigour, and try their fortunes. Thomas Tyson went out in 1526 as factor to some English merchants, at the West India Islands. Similar factors, agents, private adventurers, &c., went out similarly from France and Portugal; and from the circumstances of the case, Spaniards were considered as the common enemy of all, so they joined one another without respect to nation. The Spaniards appointed guards along the coasts, with orders to massacre all interlopers.

Thus originated a perpetual system of war between the Spaniards guarding the islands and the adventurers. Sometimes the latter would make a descent upon some weak town, and pillage it, in revenge for the hostility of the Spaniards. They learned to cure and preserve the flesh of cattle in a peculiar way, practised by the Caribbee Indians, who called the flesh in this state *Boucan*; from whence was formed a French verb *boucaner*, which became afterwards applied to the adventurers who practised this art, and the English transformed it into *Buccaneer*.

The Buccaneers employed themselves in trading with the natives, in fighting against the Spaniards, in hunting wild cattle, of which they made their *boucan*, and in cutting logwood in the bay of Campeachy. The constant aim of their opponents was to burn their log-huts, to hunt them from place to place, and to murder them wherever they could meet with them. These atrocities had the effect of drawing still closer, the ties of amity among the Buccaneers, and everything Spanish was looked on as lawful prey. When any of them returned to Europe, their accounts raised universal indignation; and many adventurers were so excited as to go out without actual necessity, but purely from a spirit of daring, and join the Buccaneers. Others went out with commercial views, determined to trade in spite of the Spaniards.

When England and France were at war with Spain, they gave commissions to the Buccaneers of their respective nations in the West Indies, thereby legalizing, in a certain degree, their mode of existence. In 1625 France and England took the island of St. Christopher, which then became the head-quarters of the Buccaneers, and as there was a laxity of principle among most of the early governors sent out to the

West Indies, they shared the spoils of the Buccaneers on occasions when the law of nations would not justify it. Tortuga afterwards became another head-quarters of the Buccaneers.

In 1638 the Spaniards retook Tortuga, and killed all the adventurers who were then on the island; but the rest came to their aid, and again expelled the Spaniards, and then formed a sort of social system, by which they governed themselves in their domestic arrangements. Locks, bolts, or other fastenings were proscribed as being inconsistent with the good feeling among them. Meat and other necessaries were in common among the whole of them, and were not considered as private property. Other possessions were treated in a similar manner. Every Buccaneer had a partner or companion, with whom he shared everything that was deemed private property, and when one of them died the other succeeded to his property. A very little reflection is sufficient to show that this was not a social arrangement calculated to endure any length of time; but it accorded with the singular bond by which these men were connected.

Many remarkable men joined the Buccaneers at different times; but the most so was Henry Morgan, a native of Wales. He attacked and took numerous forts and islands in the West Indies, which were strongly fortified, and displayed great abilities. But it is hardly to be expected that a man who voluntarily takes up such a life, will show the great and humane points of a conqueror's course. He tortured his prisoners, to make them confess where their treasures were hid, and showed numerous other examples of cruelty. It was, however, a proof of the most intrepid courage, that he actually crossed the Isthmus of Darien from the Atlantic to the Pacific ocean, and opened a new field to the exploits of the Buccaneers among the islands of the latter. To accomplish this feat, he fitted up thirty-seven vessels, manned by French and English, to the amount of 2000 men. He took the island of St. Catalina, and left a garrison there. He then landed on the isthmus, and took the castle of San Lorenzo, where he put nearly all the Spaniards to death. Having left part of his men to guard the castle, and others to mind the ships, he proceeded with the rest in a land journey across the isthmus, and in ten days, reached the rich city of Panama, after suffering dreadfully in a march through a country known only to Indians. At Panama he encountered a Spanish force of two thousand foot, and four hundred horse, which after a severe conflict he vanquished, and captured the town. After treating the inhabitants with great barbarity, he returned to his ships, loaded with great booty. He broke the "honour" of a Buccaneer, took most of the spoil to himself, and decamped to Jamaica, and ultimately rose to high honours under Charles the Second.

Morgan's example of reaching the Pacific by way of the Isthmus of Panama incited others to the same feat; for, in 1680, three hundred Buccaneers undertook the same exploit, and, with some variation in the track pursued, succeeded in it. Among them were Lionel Wafer, Basil Ringgrove, William Dampier, and Barty Sharp, all of whom, individually, in after years published accounts of their expedition. On their way they formed an alliance with the Darien Indians, and then proceeded to attack, seize, and plunder whatever came under the denomination of *Spanish*, whether ships, forts, castles, or anything else. They gained a great deal of booty, and made some additions to the amount of knowledge then existing of the geography of the western coast of *America*

Another exploratory expedition set out under Dampier and Wafer, and, stretching along the whole coast of South America, doubled Cape Horn, and cruised along the coasts of Chili, Peru, and Mexico, attacking the Spaniards whenever opportunity for so doing occurred. From the shores of Mexico they steered across the Pacific Ocean to the shores of China, Malacca, and India; after which Dampier landed at Bencoolen, and found his way back to England, where he published a very interesting narrative of his voyage. This made him favourably known as a navigator, and he was employed by the government on a voyage of discovery to the South seas. He explored parts of New Holland, of New Guinea, of New Britain, and other places, and greatly increased our knowledge of those recently-discovered islands. Dampier ranks highly as a navigator; and when he became a regular officer in the service of his country, he found it necessary to wipe off the odium which attached to his first voyage as a Buccaneer.

In 1670 a treaty was concluded between England and Spain, one of the provisions of which was the suppression of Buccaneering: but those daring men paid no attention to the treaty; they were unaccustomed to obey the regular laws of nations, and they continued their hostility to the Spaniards.

But the end of the Buccaneers was approaching,—an end brought on by that strongest of all enemies in such cases,—a division of interests. So long as they were bound by one common tie of interest, they were very powerful; but when their interests once clashed, that very power contributed to hasten their overthrow. When war was declared between England and France in 1688, each nation armed and commissioned the Buccaneers of their own country, so that Buccaneer now fought against Buccaneer; and they now exercised towards one another the same kinds of cruelties which they, as a body, had experienced and retaliated with respect to the Spaniards. The consequence,—the natural consequence,—was, that the bond which had united them was never again tied, and their Buccaneering exploits were nearly ended. When peace was proclaimed between the two countries at home, the Buccaneers were relieved from their military or naval duties, but only a few of them returned to their predatory mode of life. Some turned planters, others negro-drivers, while others retained their ships and cruized in various parts of the world. But there were some bad spirits among them, who, too much attached to old habits to be willing to give them up, became desperate pirates, pillaging and capturing vessels of all nations without distinction, and thereby rendered themselves obnoxious to every civilized state. The navies of Europe were, therefore, on the alert to exterminate them as rapidly as possible, and by degrees these desperate ruffians were reduced to a small number, and finally exterminated.

Thus ended the exploits of the "bold Buccaneers," which lasted nearly two hundred years.

TRUTH will be uppermost, some time or other, like cork, though kept down in water.—SIR WILLIAM TEMPLE.

REASON requires culture to expand it. It resembles the fire concealed in the flint, which only shows itself when struck with the steel.—GERDIL.

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the city, which at the north, and south, has a fortified draw-bridge. Cork is described by Camden as

A pretty town of merchandise, well-peopled and much resorted to; but so beset on every side with rebels neighbouring upon it, that they are fain to keep alwaies a set watch and ward, as if they had continual siege laid unto the city: and dare not move their daughters forth into the country, but had marriages one with another among themselves, whereby all the citizens are linked together in some degree of kindred and affinity.

The inhabitants of Cork were generally well disposed to the government of Elizabeth, but they did not all like the idea of a "Scottish king," as they termed her successor, James. They refused to proclaim him; but their resistance was very feeble. They also offered a feeble opposition to Cromwell.

About this time the distinguished William Penn, then in his twenty-second year, was sent by his father to Ireland; and met, at Cork, with a celebrated preacher, named Thomas Loe, whose preaching had several years before so much affected Penn, that he began to attend a meeting of Quakers in Cork; and soon became a member of that amiable and pious sect.

When James the Second attempted to recover his throne, he found the citizens of Cork among his partisans. The city was attacked by the Duke of Marlborough, and was defended by Governor Mac Eligott, who held out for five days, and then surrendered with his garrison as prisoners of war.

The trade and wealth of Cork increased from the time of the Settlement at the Revolution, and although it has undergone many fluctuations, the city is still one of the wealthiest and most important in the south of Ireland.

The principal streets in Cork are spacious, but not well-built. The Parade, South Mall, and some others, are in good proportion; but much bad taste is displayed in the irregular and discordant appearance of the houses, which in some places exhibit a reddish brown colour; and in others, a cold gray; and in many cases they are roofed and sheathed with blue and purple slate. The prominent steeple of St Anne's is built on one side with a red sand-stone, and in the remaining three with a dark limestone.

Cork has recently been much improved by the new quays, and the new street leading to the Mardyke walk, forming a fine promenade. The ancient religious edifices have in many cases supplied building materials. The Abbey of Saint Barr, famous in the old annals of Cork, and the Dominican abbey of Saint Mary, both of which were in a flourishing state in Elizabeth's reign, have now entirely disappeared. The Augustine priory, founded by Lord Kinsale in 1420, is converted into a sugar refinery. Saint Stephen's, an old institution for the reception and seclusion of Lepers, has been superseded by the Blue-Coat Hospital.

The public buildings of Cork are the Exchange, built in 1710 after the designs of an Italian architect, with Tuscan and Doric columns, and is more remarkable for heaviness than for simplicity. The Custom-house, a plain stone building, with a pediment, and the arms of the United Kingdom. There is also the Market-house; the Barracks; the Chamber of Commerce; and two Club-houses on the Grand Parade.

The charitable buildings are chiefly the House of Industry, which affords provision for 700 individuals: two infirmaries; the Fever-hospital; the Foundling Hospital; the Magdalen and Lunatic asylums; and several other associations for similiar purposes; and schools. In 1833 Mr. Lapp made the munificent bequest of 30,000*l.* for the support of the aged protestant poor of the city. Within the last few years the old gaols and portcullis, which disfigured the main street, and St. Patrick's bridge, have been removed.

Cork owes most of its celebrity to its admirable harbour, the extent and depth of which is capable of admitting almost any number of ships of any size. The mouth of this harbour is scarcely a mile across, and is commanded by two forts. The expanse of water on entering the harbour is described as being truly magnificent. This local advantage, and its peculiar geographical situation, have made Cork the most important maritime town in Ireland. Its exports and imports are very various. Its chief manufactures are glass, paper, glue, leather, sail-cloth, coarse cloth, and distilled liquors. Its markets are abundantly and cheaply supplied.

Cork is situated fifteen miles from the sea; and its harbour, nine miles below the town, is called the "Cove of Cork." The Cove, formed by the junction of the river Lee with the sea, is surrounded by scenery, the effect of which is picturesque and imposing. From the height above Cove, a striking and lively view is presented: the bay has the appearance of a lake, in which are seen merchant-vessels at their moorings; ships of the Royal Navy; numbers of pleasure-boats gliding in all directions; some prettily situated islands; and the shores of the great island forming the northern boundary of the harbour, studded with villas. The village of Cove is chiefly peopled by pilots, sailors, and fishermen, who are described as a rough, hardy, and joyous set.

Black Rock forms a peninsula on the river Lee, and an outlet to the city about three miles distant, and is covered with good houses and neat cottages. Blarney castle is also situated on a rock, near Cork. This place is frequently mentioned as a stronghold by Sir George Carew. It was taken by siege by King William. At the top of the castle is a stone, usually pointed out to the visiter, which is said to have the property of imparting to the person who kisses it, the unenviable privilege of hazarding without a blush, that species of romantic assertion and flummery which may and ought to be denounced "falsehood." Hence originates the term *blarney*, an expressive word, and to it the inhabitants of the sister isle are often accused of being addicted.

The people of Cork are essentially commercial and social. They are said to be peculiarly fond of practical jokes, whose latitude or license is redeemed by their whim and humour.

Cork may almost be considered a protestant city. In 1833 there were only seventy-three Roman Catholics, out of 2665 freemen.

MAN is an animal, formidable both from his passions and his reason; his passions often urging him to great evils, and his reason furnishing means to achieve them. To train this animal and make him amenable to order, to inure him to a sense of justice and virtue, to withhold him from ill courses by fear, and encourage him in his duty by hopes; in short, to fashion and model him for society, hath been the aim of civil and religious institutions; and, in all times, the endeavour of good and wise men. The aptest method for attaining this end hath been always judged a *proper education*.—BISHOP BERKELEY.

IN infancy the mind is peculiarly ductile. We bring into the world with us nothing that deserves the name of habit, are neither virtuous nor vicious, active nor idle, inattentive nor curious. The infant comes into our hands a subject capable of certain impressions, and of being led on to a certain degree of improvement. His mind is like his body. What at first was cartilage gradually becomes bone. Just so the mind acquires its solidity; and what might originally have been bent in a thousand directions, becomes stiff, unmanageable, and unimpressible.——G.

PERRANZABULOE.

The Lost Church Found.

History is not silent, and popular tradition, confirmed by antiquarian research, has long pointed to Perranzabuloe, as the site and sepulchre of an ancient British church, founded at a very remote period, flourishing for a succession of ages in the midst of a very fertile district, and dispensing to a rude, but religious people, the blessings of Christianity in its simplest form of primitive purity. At that distant day, the northern boundary of the extensive hundred of Pydar, yielded to none other in Cornwall, either in the fertility of its soil or the abundance of its produce.

At the time when Christianity was first introduced into Cornwall, the people, like all the other inhabitants of the British Islands, were devoted to the strange religion of the Druids; and Cornwall, from the natural boldness and wildness of its scenery, seems to have been more than any other portion of Britain, the favourite seat of Druidism. The people, no doubt, partook of the savage wildness of their rugged mountains, and the barbarous character of their inhuman creed, and did not readily relinquish a religion that was so blended with their national feelings and institutions, and so closely associated with their wild and romantic scenery; and therefore, were slower than the other inhabitants of Britain, in embracing the humbling doctrines of a meek and crucified Saviour. At what moment Christianity was first planted in Cornwall historians are by no means agreed; it is, however, probable that it was introduced early in the third century, and in the fourth, there is little doubt that the true faith must have made great progress, as the nobles, clergy, and people, were at the end of it "living happily together in the bonds of Christian unity."

The first Cornish apostle of any note was Corantinus, (now called Cury,) born in Brittany, who first preached to his own countrymen, and then to the Irish, till being violently expelled by them, he passed over into Cornwall, and settled at last at the foot of a mountain, called Menehont, was consecrated bishop by St. Martin, Bishop of Tours, and had the satisfaction of consecrating almost the whole of Cornwall before his death, (A.D. 401.) Scarcely was Corantinus gathered to his fathers, when a more celebrated man than himself landed in Cornwall, and from his extraordinary sanctity, acquired the highest reputation amongst the people. This was Piranus, born of noble parents, in the county of Ossory, in Ireland (A.D. 352), where he passed the first thirty years of his age, leading a life of strict morality, though not yet converted to the Christain faith. About the year 382, his conversion having been effected by the conversation of a Christain laic, he determined to visit Rome, where he heard that that faith into which he had long desired to be baptized was sincerely taught and faithfully practised. He accordingly went to the imperial city, was further instructed in the Christian religion, and then baptized. He devoted some years afterwards to the diligent study of the Scriptures, the collecting of books, and the practice of Christian virtues; he was then ordained bishop, and sent back to Ireland, in company with five other holy priests, who were all afterwards bishops.

His first residence was in the heart of Ireland, in a place encompassed with woods and morasses, close to a lake, called Fuaran; here he built a cell for his habitation, and so great was his renown, that his cell was daily thronged with visiters from all parts of Ireland, whose numbers and officiousness became at last so intolerable to the saint, that giving out that he had received a divine call, and was desirous of preparing himself for his latter end, by a more perfect retirement from all worldly distractions, he passed over into Cornwall, taking with him his mother, whom he had converted, and many others. Landing at St. Ives, they dispersed themselves over the country, and acquired such veneration among the people, on account of their piety, that the Cornish have consecrated almost all their towns to the memory of Irish saints. Piranus settled himself in a district near the sea, that is now known by the name of Perranzabuloe, or St. Pieran in the Sand.

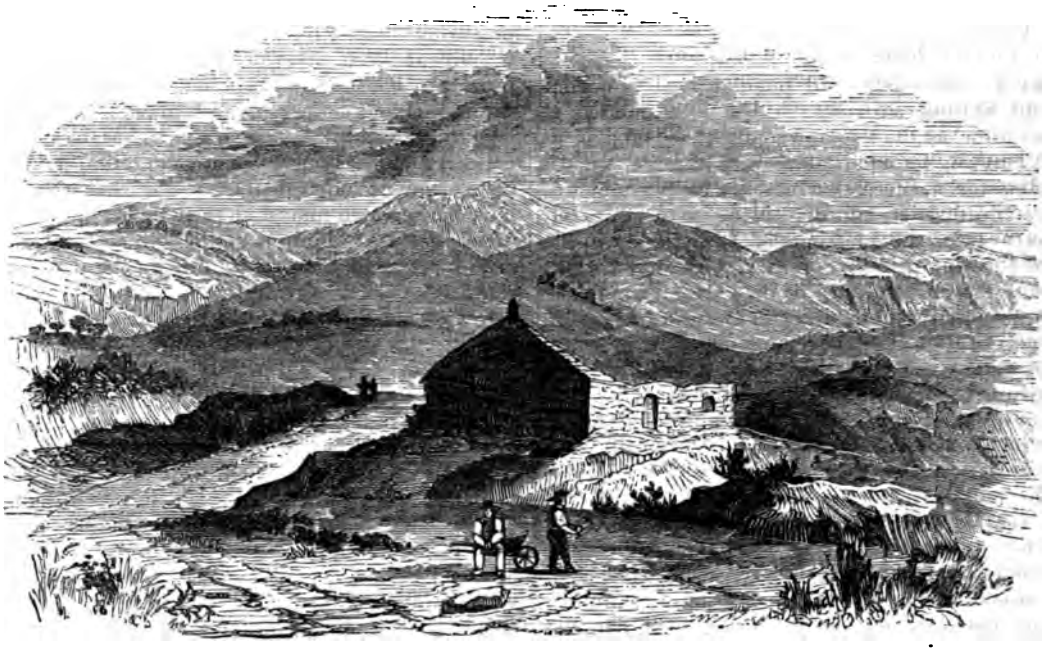
Here the holy man fixed his abode close to a spring of water, that still bears his name. While from this well he drew his beverage, he daily refreshed the multitudes who thronged around him with the living waters of eternal life; instructed the ignorant, confirmed the weak, and earnestly exhorted them to turn from their dumb idols, and worship their spiritual God in spirit and in truth. But it was not only *that* "knowledge which maketh wise unto salvation," that Piranus imparted to them from the pure word of God:—from the abundant stores of a highly cultivated mind, he instructed them in many of those elements of knowledge that are adapted to the purposes of common life—more especially communicating to them the art and mystery of working and reducing from their oxides the metals which abound in that neighbourhood. So that, with good reason, the Cornish miners have always regarded with peculiar veneration, the name of Piranus, as their tutelary saint and benefactor.

Sensible of his approaching end, he calmly commanded his grave to be dug, and with a resolute step descending into it, he kneeled down, and meekly surrendered his soul into the hands of his Creator.

On a spot so dear to memory, as enshrining the mortal remains of the beloved bishop and pastor of their souls, his affectionate flock erected a church, inscribed with his name, and dedicated to the service of that pure religion which he so faithfully taught; and the church of St. Piran became the resort of Christian worshippers from all parts of the world.

During the dark and troubled times that succeeded, little is known of the history of St. Piran's church, beyond the fact that time did not diminish the reputation of the saint. On the contrary, his shrine became the resort of devout worshippers without number, and princes and nobles did not disdain to kneel at the tomb of the Cornish apostle. Alfred the Great had ever viewed such spots as hallowed ground, and there is little doubt but that it was before the shrine of Piran this pious prince threw himself in fervent adoration, at the time when he visited Cornwall. In after ages, as the Romish superstitions increased, and the merit of pilgrimages and of sin-offerings became at once an article of faith and a source of revenue to a corrupt priesthood, so were multiplied to an extraordinary extent the rich oblations that were laid on St. Piran's tomb. It was at length considered by Henry I. sufficiently valuable to be made by him a royal gift to the Dean and Chapter of Exeter.

From that distant day, what hand shall lift the veil that for seven hundred years has concealed St. Piran's church from the gaze of adoring crowds? Who shall declare the mysterious truth that stamps a character of almost incredible fiction on the history of Perranzabuloe? Happily for posterity, history is not entirely silent; and seven centuries have not sufficed to blot out the record of events which *religious* tradition has carefully preserved among the inhabitants of Perranzabuloe. While it points with un-



THE LOST CHURCH OF ST. PIRANUS, IN CORNWALL.

doubted certainty to the past distinction of the ancient church—its purity—its stability—its independence,—it tells moreover of aggression—repeated, insidious, long-resisted aggression. It speaks of the ruinous effects of natural causes—of the overwhelming weight of the great Western Sea—advancing, invading, year after year, this once fruitful district—and gradually breaking down all the ancient barriers that had for many ages successfully resisted the inroads of the restless Atlantic. It tells of the strenuous exertions of the inhabitants in stemming the invading waters—of the gradual submersion of this devoted portion of Cornwall;—it points to the hillocks of sand, as the collected offscouring of the turbulent ocean, which the north-west wind, "the tyrant of this coast," sweeping along with unceasing and accumulating rapidity, has spread over to a great depth, the once verdant meadows of this ill-fated parish. Vesuvius has not more effectually thrown its sable mantle of volcanic dust over the city and gardens of Pompeii. Like that unhappy city, the church of St. Piran was buried, but not overthrown: its foundations being on a rock, and its walls compactly cemented, it yielded not to the outward pressure; the fine sand insinuating itself through every aperture, like drifting snow, rapidly accumulated around its passive victim,—deeper and deeper yet it thickened on every side, and rising at last above its highest pinnacle, accomplished the total enshrinement of the sacred edifice. The sandy submersion was complete—the overflowing scourge had so effectually done its work, that not a trace remained to mark the place of entombment, save a swelling mound that lifted itself unaccountably high in this waste of sand, and seemed to throw an air of probability on those strange tales of the neighbourhood, which, though rife on every Cornish tongue, savoured only of legendary fiction.

Many have been the attempts made, from time to time, by enterprising individuals, to clear away the superincumbent mass, and to restore to the light of day so interesting a relic of the piety of their forefathers. At times the work seemed to prosper in their hands, and, at the moment when success had almost crowned their labour, their old enemies, the waves and the winds, would mar the enterprise, and the church slept on in her sandy bed.

At length, in the year 1835, a gentleman* of singular enterprise and perseverance, neither deterred by difficulties, nor intimidated by former failures, resolutely put his hand to the work; and though the waves foamed on the neighbouring shore, and the winds, with more than accustomed fury, "drove and whirled" around him the densest clouds of suffocating sand, yet, nothing dismayed, the work advanced—every obstacle was overcome—till at last he had the unspeakable honour and happiness of laying open to admiring crowds the ancient British church, and of presenting, in all its unpretending simplicity, its rude but solid workmanship, to the wonder of antiquarians, and the gratitude of Cornish men.

The sand, that centuries had been accumulating, was carefully removed; and every part of the sacred building, though deeply incrusted with the penetrating dust, was easily restored to its original state, so that, with the exception of its roof and doors, it was found to be as perfect as when first erected. The masonry of the walls is remarkably rude, but as remarkably solid and compact; and, without doubt, is one of the earliest specimens of stone-building that superseded the mud-wattled walls of the first British churches. It appears never to have contained more than one small window, and probably never possessed a roof, or otherwise the service at that early time might have been performed by the light of tapers, as was the custom in some of the eastern churches.

The door-way is in high preservation†, neatly ornamented with Egyptian zig-zag, or arrow, having on the keystone of its round-headed arch a tiger's head sculptured, and two human heads on the corbels of the arch. On entering the interior, it was found to

* William Michell, Esq., of Compiegney, near Truro.

† In the Appendix to the second edition of the work from which this account is taken, is the following notice.—"On visiting the ancient church of Perranzabuloe, soon after the first edition was sent to the press, the writer was grieved to find that the old enemy had been again most actively at work, having accumulated the sand so deeply around the building, as once more to threaten its speedy and entire entombment; added to which, the spoiler's hand has mischievously thrown down, or removed, the whole of the beautiful doorway, and has, moreover, shown so little reverence for this interesting remnant of ancient piety, that the interior of the sanctuary itself has been desecrated by many acts of wanton profanation."

contain none of the modern accompaniments of a Roman Catholic place of worship. Here was no rood-loft for the hanging up of the host, nor the vain display of fabricated relics,—no latticed confessional, no sacring bell, no daubed and decorated images of the Virgin Mary or of Saints, to sanction the idolatrous transgression of the second commandment. Here was found nothing that indicated the unscriptural adoration of the wafer, or the no less unscriptural masses for the dead. The most diligent search was made for beads and rosaries, pyxes and agnus deis, censers and crucifixes,—not one, not the remnant of one, could be discovered. Strange that this *ancient* church should so belie the Papists' constant appeal to *antiquity*—to the *faith of their forefathers*—to the *old religion!* Strange that it should, on the contrary, so closely harmonize with that *novelty* which Cranmer and the Reformers introduced into the doctrine and ritual of the Church of England! For, in the absence of all these inventions and wonder-workings of Popery, what does this little church contain? At the eastern end, in a plain unornamented chancel, stands a very neat, but simple, stone altar; and in the nave of the church are stone seats, of the like simple construction, attached to the western, northern, and southern walls. The church, originally, contained also a very curious stone font, which fortunately has been preserved; having been removed before the building was irretrievably buried in the sand. This font was transferred to the second church, mentioned by Carew and Norden, and now stands in the third, or present parish-church at Lambourne. On removing the altar, three skeletons were discovered; one of gigantic dimensions, the second, of moderate size, and the third, apparently of a female. No doubt the former is that of the old saint Piranus himself, and the latter, his aged mother Wingela. They were carefully replaced in their narrow cell.

Such are the particulars attending the discovery and restoration of Perranzabuloe—a discovery most interesting to the lover of antiquarian lore—a restoration invaluable to those who are happily within the pale of the Established Church. It illustrates, in a manner most literally and strikingly true, the actual condition of the long lost Church of England at the time of the Reformation.

[Abridged from the Rev. C. Trelawny Collins' *Perransabuloe.*]

"WOMAN'S MISSION."

[We copy from the *British Gazette*, the following Review of an interesting little volume, which has just appeared under the above title.]

In the present age of book-making—of compilation, and of wire-drawn thoughts, such a work as the little book before us is peculiarly welcome. It is a concentration of deep and original thought—the eloquent utterance of a beautiful spirit, which most powerfully addresses itself to the hearts and understandings of women. Their mission is thus explained;—

> We claim for them no less an office than that of instruments (under God) for the regeneration of the world—restorers of God's image in the human soul. Can any of the warmest advocates of the rights of woman claim or assert for her a more exalted station—a nobler destiny?

It is the object of this work not only to prove that such is the destination of women, but also to point out the means by which that destination may be accomplished. We think the author has been eminently successful in the attempt. The most convincing test that this is the *real* mission of women, is the universality of its application. A fundamental principle, capable of unlimited extension, at once bears the stamp of truth. The influence of women in social regeneration, such as depicted here, has nothing in it dazzling or alluring to the worldly eye; still, all women who can think and feel, must acknowledge that in fostering a disposition so meek and lowly as is here recommended, they will at the same time take a position most lofty and dignified. An unselfish spirit, self-renunciation, self-devotedness, are insisted upon; yet these qualities are clothed with so much loveliness, the character of a Christian woman is pourtrayed as so spiritual, so heavenly, that in endeavouring to acquire these blessed attributes, who but must feel that they are ascending in the scale of being, and thus approaching nearer to their God?

All classes—all characters, may alike assist in the great work of social regeneration. The timid and humble, in this exaltation of the milder virtues, may, by self-sacrifice, gain courage and strength to exercise them. Those who have quietly acquiesced in their inferiority to lordly man, may shake off the earthy part of their humility, in recognising qualities in which they are his superior. The proud of heart, the strong in intellect, who, feeling the largeness of their own powers, struggle in vain to assert their equality with man, and constitute themselves his rivals instead of his coadjutors,—when they have a more glorious path, a holier destiny disclosed to them, may cease the undignified contest, and endeavour to become "God's missionaries upon earth."

The difference between power and influence, is extremely well defined at the opening of the work. Influence is considered as more peculiarly belonging to woman, and to be exerted in the cultivation of the religious and moral portion of our nature. The influence of mothers is forcibly delineated, and they are called upon to render this influence beneficial in the education of their children. This chapter contains much that is valuable and original. A rapid historical sketch is next taken of the influence of women in all ages,—we cannot forbear giving an eloquent passage from this section of the work.

> The Gospel announced on this, as on every other subject, a grand comprehensive principle, which it was to be the work of ages (perhaps of eternity,) to develop. The rescue of this degraded half of the human race was henceforth the ascertained will of the Almighty. But a long series of years was to elapse before this will worked out its issues. Its decrees, with the noble doctrines of which it formed a part, lay buried beneath the ruins of human intellect. But they were only buried, not destroyed; and rose like the weeds on a ruined edifice, to adorn the irregularity which they could not conceal. The fantastic institutions of chivalry, which it is now the fashion to deride, (how unjustly!) were among the first scions of this plant of heavenly origin. They bore the impress of heaven, faint and distorted indeed, but not to be mistaken! Devotion to an ideal good, —self-sacrifice,—subjugation of selfish and sensual feelings; wherever these principles are found, disguised, disfigured though they be, they are not of the earth earthy. They, like the fabled amaranth, are plants which are not indigenous here below! The seeds must come from above, from the source of all that is pure, of all that is good! Of these principles the Gospel was the remote source; women were the disseminators.

The gradual decline of the *beneficial* influence of women is well described, and the cause of this degradation is discovered and pointed out with judgment and acuteness. The proper sphere of the influence of women is shown to be domestic life, and the education which should best fit them for their duties is then discussed. The following extracts will give an idea of the manner in which the subject is treated.

The grand objects, then, in the education of women ought to be the conscience, the heart, and the affections; the development of those moral qualities, which Providence has so liberally bestowed upon them, doubtless, with a wise and beneficial purpose. Originators of conscientiousness! —how can they implant what they have never cultivated, nor brought to maturity in themselves? Sovereigns of the affections! how can they direct the kingdom, whose laws they have not studied, the springs of whose government are concealed from them! * * * Let the light of intellect, and the charm of accomplishments, be the willing hand-maids of cultivated and enlightened conscience. Cultivate the intellect with reference to the conscience, that views of duty may be comprehensive as well as just; cultivate the imagination still with reference to the conscience, that those inward aspirations, which all indulge more or less, may be turned from the gauds of an idle and vain imagination, and shed over daily life and daily duty, the halo of of a poetic influence; cultivate the manners, that the qualities of heart and head may have an additional auxiliary in obtaining that influence by which a mighty regeneration is to be worked.

Love, in the common acceptation of the term, is a folly—love, in its purity, its loftiness, its unselfishness, is not only a consequence, but a proof of our moral excellence. * * * What is meant by educating young women to love wisely, is simply this—that they be taught to distinguish this feeling from that false spirit which usurps its name and garb; that they be taught to abstract from it the worldliness, vanity, and folly with which it has been mixed up. They should be taught that it is not to be the amusement of an idle hour, the indulgence of a capricious and greedy vanity, the ladder by the assistance of which they may climb a few steps higher in the grades of society—in short, that except it owes its origin to the noble properties of the heart and mind, it is nothing but a contemptible weakness, to be pitied, perhaps, but not to be indulged or admired.

The influence of women is or ought to be a moral influence; and that it may have its full effect, the main object of their education ought to be to expand and perfect their moral nature, and to implant deeply the fact of their influence, and their own consequent responsibilities. This foundation being laid, let women be elegant, be accomplished, be everything that society requires of them; but let them not forget, that these powers are not given for themselves, but for God's glory and the good of their fellow creatures.

It is not intended here to give anything like an analysis of this work, but merely to show its scope and tendency. We have never met with any book, which in so small a compass furnishes more food for serious meditation. Reason and feeling seem to have been closely allied in its composition; acuteness and perception, accuracy of judgment, and elegance of taste, have lent their aid most powerfully to strengthen and adorn this bright embodiment of a high moral feeling, and a pure and fervent spirit of religion. It appears to us that many starting truths are here announced, which, as in geometrical propositions, are not seen when first enunciated, but when once demonstrated it is impossible to refuse to accept them as truths; and surprise is excited that what seem so simple and evident, had not previously been perceived. The causes of many seeming inconsistencies and contradictions are in this manner made manifest, and intricacies and contradictions are thus evolved and laid open. The chapters on female influence, on education, and on maternal love, abound with instances of this kind. Truth seems to be the only aim of the writer, and he searches for it with so much acuteness, and displays it with such distinctness and vividness, that prejudice and bigotry must sink abashed before the brightness of its manifestation. A religious spirit breathes through the whole, but there is an entire absence of all *cant*. Religion—Christianity—is to be the basis of feminine excellence; but it is the spirit of the Gospel which is to live in the heart and to influence the character. The Christianity which inspires these pages is drawn pure from its original source.

The fear lest our praise of this work should be considered excessive has restrained our pen from entering still further into its beauties, for we think of it even more highly than we have ventured to express. The following short extracts will, we trust, in some degree justify our opinion; but we would refer to the book itself, in further corroboration of all we have said.

THE IDEAL.

It is the fashion to sneer at those *ideas*, for which men in differing ages have suffered toil, pain, privation, death; the object might be wild—the recovery of a shrine; weak—the love of a woman; untrue (if we are to believe the infidel)—the announcement of a world beyond the grave: be it so; poor victims of idiosyncracy! They sacrificed all tangible and solid benefits for a vapour. But who are they, at whose name the eye flashes, and the cheek colours; whose memories leave behind them a train of light, like a glorious departing orb? The successful speculator? the luxurious epicurean? the wealthy? the worldly? no;—the oppressed but dauntless victim of tyranny; the devoted, though perhaps mistaken, sufferer for fantastic loyalty; the agonized martyr to truth.

MATERNAL LOVE.

Disease, deformity, ingratitude,—nothing can check the flow of maternal love. By entrusting to woman such a revelation of himself, God has pointed out whom he intends for his missionaries upon earth,—the disseminators of his spirit, the diffusers of his word. Let men enjoy in peace and triumph the intellectual kingdom, which is theirs, and which doubtless was intended for them; let us participate its privileges, without desiring to share its dominion. The moral world is ours,—ours by position; ours by qualification; ours by the very indication of God himself, who has deigned to place in woman's heart the only feeling, (that we know of here existing,) which affords the faintest representation of his most unextinguishable love to us, his erring and strayed children; the only affection which enables the possessor to love on through sin and folly; and even when sin and folly have brought their last, worst consummation.

Oh, those who know, those who have witnessed the lingering yearning of a mother's love, after one lost in crime, and wandering, and ingratitude; when even the father's heart was turned to stone—the unextinguished, unextinguishable sentiment, lighting up even the dying eye, and breathed forth in the dying prayer, can alone judge of these things.

RELIGION ENHANCES EVERY ENJOYMENT.

We may see how completely religion is adapted to the nature of man, by observing that even the elements of enjoyment, (and they are many, though fleeting,) which this world contains, are never fully tasted but by religious persons. Those abundant sources of pure delight, which are to be found in the heart, the intellect, and the imagination, are never received in their fulness but by them; and why? because they are the germs of their future and more glorious being, and can only flourish in a soil akin to that ultimately destined for them. In a worldly mind, like plants removed from their original soil and climate, they exist, indeed, but with a blighted existence; and produce—but how degenerate is the production! Everything that wants religion, wants vitality. Philosophy without religion is crippled and impotent; poetry without religion has no heart-stirring powers; life without religion is a complex and unsatisfactory riddle; the very arts which address themselves to the senses never proceed so far towards perfection, as when employed on religious subjects. Religion then can be no obstacle to enjoyment, since the only sources of it which are confessedly pure are all enhanced by its possession. Even in the ordinary commerce with the world, what a blessing awaits an exemption from the low and sordid spirit, the petty passions and paltry feelings, which abound in it.

This language is not born of the intellect alone—it originates in the soul. There are but few persons who could not derive improvement from the perusal of this book; and only those who are sunk into the lowest depths of worldliness and sensuality could fail to be penetrated by its unworldly spirit, and touched by its simple eloquence.

RECREATIONS IN NATURAL PHILOSOPHY.
No. XVI.
On the Elasticity of Solids.

It follows from the constitution of solids that any forces, which tend to bring their constituent atoms closer together, must diminish their bulk; which on the contrary becomes enlarged, by enlarging the pores or spaces between the atoms. This property can easily be verified when flexible and porous bodies, such as wood, are submitted to experiment; but there is a great number of bodies, such as the metals, which are only slightly compressible, and require great force to produce, and very delicate instruments to measure the compression.

If the forces exerted upon a solid do not exceed a certain limit, the resulting increase or diminution of volume is not permanent; for, when those forces cease to act, the body returns to its primitive form, and occupies its former volume; but, if the limit be exceeded, the form and density of the body are subject to a permanent change. In the first case the constituent atoms of the body return to their original position of equilibrium, when the disturbing cause is removed; and in the second case they are placed in new positions of equilibrium after the disturbing force has ceased to act. In the first case the body, or its constituent atoms, have been compressed within what is called the *limits of elasticity*; but, when the body is changed in form or in volume, certain terms are used, according to the nature of the forces applied. If a rod of metal be forced through a hole smaller than its own diameter, we find the rod to become longer and less thick, and the metal composing the rod is said to be *ductile*. If a sheet of metal be hammered or passed through rollers, and we find the sheet to be larger and thinner after the process, we have an example of *malleability*. When a solid is stretched by any force, which being removed, the solid regains its original form and dimensions, we have an example of the *elasticity of tension*; and when it is twisted, and no permanent change results when the twisting force is over, we have a specimen of the *elasticity of torsion*.

There are many metals which by being hammered or rolled become denser; that is, the action of these forces brings the atoms closer together, and into a position of equilibrium which is permanent. This is a proof of their imperfect elasticity.

When an elastic body is disturbed from its position of repose, it generally regains that position by a series of oscillations or vibrations, during which the constituent atoms are in a state of disturbance, which we will endeavour to trace by referring to figures 1 and 2, which we will suppose to represent two bodies of very unequal elasticity; such, for example, as a slip of steel, and a slip of lead. The steel on being bent will regain its former position, when the bending force is removed; but the lead will acquire a permanent change in form. Suppose, for the sake of illustration, that A B, fig. 1, is a metallic slip, the small dots representing the atoms or particles of matter which compose it; then the particles on the surface C are as far apart as those on the surface D. If we now bend the slip of metal into the form shown in fig. 2, a change takes place in the distance of the particles from each other; those on the one surface are separated further asunder, while those on the other surface are brought closer to each other. This is occasioned by the circumstance that the surface C becomes, in the process of bending, a portion of a larger circle than the surface D; and as there is the same number of particles in both, the intervals between the particles of the former must be wider than between those of the latter. Now the lead submits to this disarrangement of its particles without much difficulty, because the intensity of the force, by which the particles mutually attract each other, is not so strong, but that some of the particles move slightly in position, so as to fill up the partial vacancies which the bending produces in the convex surface. But with the slip of steel this is not the case; each particle is held in a given position with respect to those around it; the particles resist strongly the disturbance caused by the bending, and do not change their position with regard to each other:—the particles on the convex side resist the formation of vacancies between them, and do not permit the entrance of other particles to fill up those vacancies. The consequence is that, when the bending force is removed, the particles, urged by a strong adjusting process, return to their former state, which they are enabled to do, because no other particles have insinuated themselves into the temporarily vacated spaces. But the slip of lead does not return to its original state, because, in the first place, the tendency to do so is but weakly manifested; and in the second place, because the partially vacated spaces have become, during the process of bending, occupied by other particles, which thus impede the return of those originally settled there.

Observing these qualities and their consequences, (says Mr. Tomlinson, whose *Manual of Natural Philosophy* has supplied us with this illustration,) we come now to apply the term *elasticity* to the tendency of a body which is under pressure, or which is submitted to a disturbing force, to return to its former state when such pressure or force is removed; and we distinguish degrees of comparison in different bodies according as they develope much or little of this property. Thus, a wrought-iron bar or nail may be bent by a certain force; but when such force is removed, the metal does not return to its former condition: it acquires a convex and a concave side, and shows no tendency to return to its original form. But, if we operate on a cast-iron bar or nail, we obtain a very different result; we find, in the first place, that we cannot carry the bending process to a great extent without breaking the bar or nail; but if we confine the pressure within the limits of the elasticity of the bar, it will regain its former position when the pressure is removed.

This has given rise to two kinds of elasticity,—each of which has its degrees of quantity, the one perfect or imperfect, and the other extensive or limited; or, more correctly speaking, elasticity is estimated in two ways as regards *perfection* and as regards *extent*. Thus a slip of glass has a perfect, but not an extensive elasticity; it is perfect, because it regains its former position when the disturbing force is removed; but it is not extensive, because, if the bending exceed a certain range, the glass will break. A mass of well-kneaded dough has an extensive, but not a perfect elasticity: it is extensive, because we may compress it into various forms; but it is not perfect, because it seldom or never regains its former bulk and figure, when the pressure is removed. The same remark applies to a piece of lead. The well-tempered spring of a chronometer, and the hair-spring of a watch, are instances of almost perfect and extensive elasticity, and afford, perhaps, the most striking instances of elasticity ever manifested by solids; their elasticity is nearly perfect, because, although turned into a number of coils, they will return to nearly their former condition, when the bending force is removed; while at the same time the circumstance of their being so coiled, without breaking, obtains for them the character of extensive elasticity.

There are many examples in the arts, of great elasticity being communicated to certain bodies chiefly by a sudden variation of temperature. Thus, steel heated to a certain point and plunged into a cold liquid becomes hard, elastic, and brittle, and it acquires these new properties in a more eminent degree, in proportion as the reduction of temperature has been prompt and extensive; this operation is called

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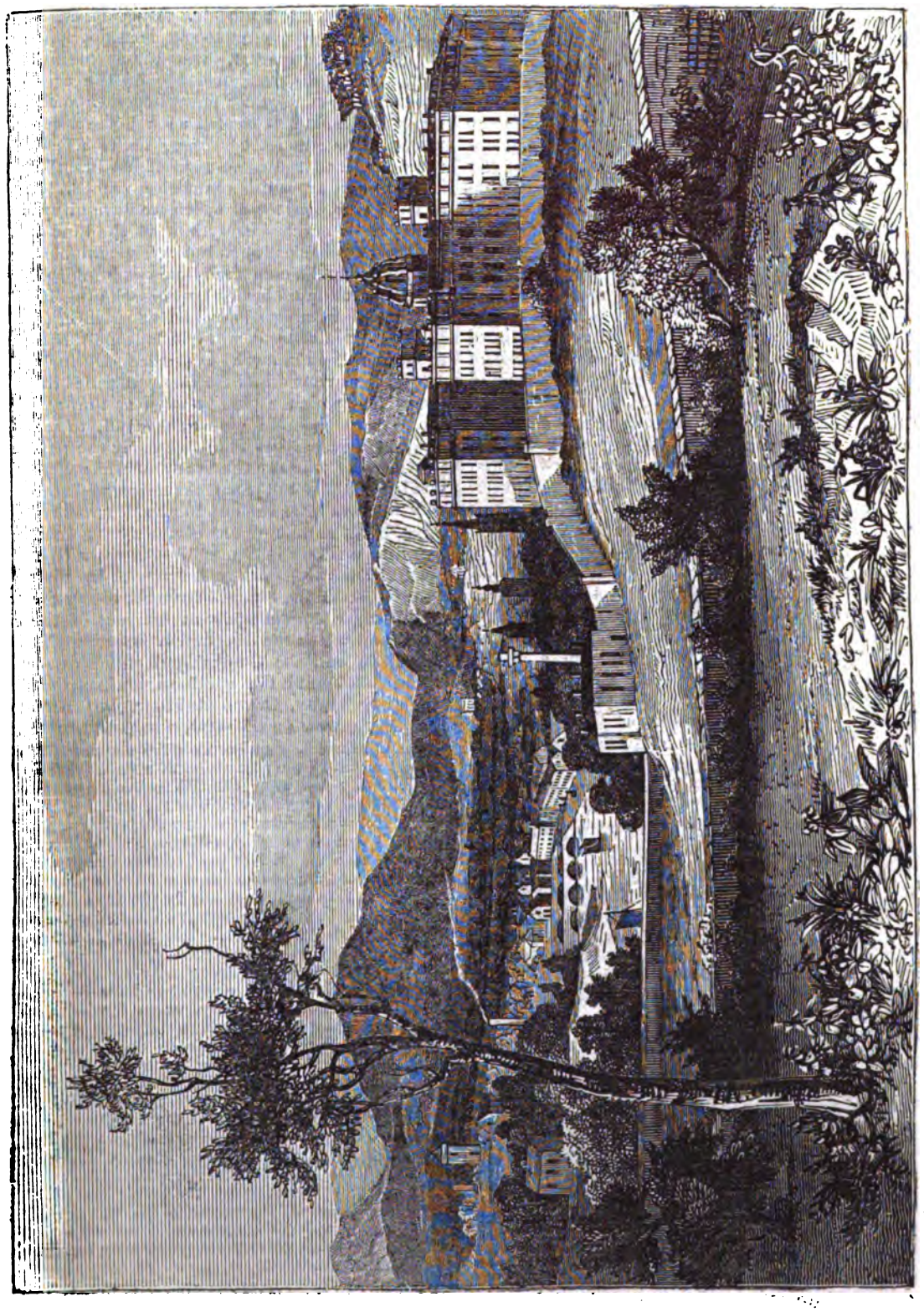


THE CRICHTON LUNATIC ASYLUM, DUMFRIES.

THE CRICHTON INSTITUTION FOR LUNATICS,

AT DUMFRIES, IN THE SOUTH OF SCOTLAND.

THE human mind is a noble, and, in many respects, a fearful subject of contemplation. It is noble when we consider it with respect to its vast power; its resources almost infinite; its mysterious nature; its tangible, but no less mysterious dwelling-place; and the inexplicable collection of causes which produce so endless a variety of effects.

A certain degree of solemnity is necessarily attached to those subjects so far removed from our understanding; a large amount of veneration also is due to that power within us, which we are unable to define, still less to explain, a power which is the gift of that Almighty Being who made man after his own image. Thus, the contemplation of the human mind forms a noble subject of study; but, when we come to consider man as a being subject to stormy passions and fearful propensities; subject to wanderings and irregularities; capable of perpetuating evil, and illustrating all the endless varieties of sin, he is then presented to us, as a being entirely dependent on a higher power, for all that renders life good and desirable.

Whatever may be the causes which produce mental phenomena in the human species, we are reminded not only of vast and wondrous powers, but also of sad and deplorable weaknesses. To behold the mind of such a man as the estimable Cowper, delighting and instructing his own age and succeeding ages, and confirming the wise, strengthening the weak, reproving the foolish, and admonishing the simple—a mind so rich, and apparently so powerful, and yet its owner the victim of mental disease, we cannot suppress an involuntary shudder when we think and know that "the ills man's flesh is heir to," extend their dominion even as far as the mind.

We have been long engaged in the pleasant task of offering to our readers much information on a variety of subjects of study and inquiry, wherein we have seen the operation of the mind of man in all its strength. We have also, on two occasions, referred to the human mind, in a state of weakness and debility, under the pressure of the most dreadful disease to which humanity is subject. By referring to the *Saturday Magazine*, Vol. I., p. 103, and Vol. XIII., p. 45, the reader will find several details respecting two noble institutions for the relief of the insane; viz., THE MIDDLESEX LUNATIC ASYLUM and the LINCOLN ASYLUM. We now propose to call the reader's attention to an institution no less noble in its objects nor less extensive in its useful effects than the two institutions before referred to; viz., THE CRICHTON INSTITUTION for Lunatics, at Dumfries, a view of which forms the frontispiece to the present number.

More than thirty years ago, a few sound-thinking men, supported by the then general feeling of the legislature to attend to the wants of their fellow-creatures, and to alleviate the sufferings of humanity, caused a law to be passed to *allow* (it was not believed it could ever be necessary to *compel*) the magistrates of every county in England and Wales, to build by assessment, a suitable asylum for the care and proper treatment of the insane poor of this kingdom. We have on former occasions alluded to the slow progress which, during these years, has been made in carrying this law into effect; and although late satistical researches have shown that insanity, not only among the poor, but equally among the rich, has increased to an extent far bevond the proportional increase of our population, and prevails to a degree which it is melancholy to contemplate; still, unless it be where individuals speculate for gain, and the confinement of the lunatic has become a mere business concern, we have yet but few establishments in England that are truly deserving of praise. Even some of our best-constructed county establishments are marred in their management, and we fear that too often ignorance of the true principles of treatment, prejudice, and even party feelings, have misdirected the efforts of very amiable men, and led to confusion and irregularities, which, it is probable, will be very difficult to eradicate. There is one splendid exception, but we regret to say, it is not among our county establishments, where improvement has progressed with the knowledge of the age—where chains and manacles are now altogether unknown—where the lunatic is treated as a human being, and where, if he cannot be cured, he is affectionately cared for, the "rooted sorrows of his brain" soothed into tranquillity, and his mind has peace*.

The Establishment of which we have given a view, promises to surpass everything of the kind that has yet been established in Europe. The amiable founder having had at her command funds so ample, that, with the approbation of her co-trustees, she has been able to adopt every suggestion which experience, (not only in this, but in every country in Europe,) has shown to be useful, or in any respect necessary for the successful treatment of all the many varieties of mental aberration, which a charity such as that at Lincoln could not accomplish; and above all, to secure the services of physicians who have made the nature and treatment of insanity the study of their whole lives. The beauty of the scenery may be guessed at from the view we have been enabled to give. It embraces the whole basin or vale of one of the most romantic and beautiful streams in Scotland—the river Nith. The town of Dumfries, emphatically styled by the Scotch, "the Queen of the South," stretches along the banks of this river, immediately at the foot of the rising ground on which the Institution is built. The Solway Frith and the Cumberland and Westmoreland mountains bound the southern horizon, while the hills of Galloway, Crawford Moor, and Annandale, encircle the view on the west, north, and east.

The Crichton Institution, says the statement of its directors, unites all the advantages of a public and a private Asylum. It has been founded and endowed by MRS. ELIZABETH CRICHTON, widow of the late JAMES CRICHTON, of Friars' Carse, in the county of Dumfries, Esq., from funds left by him, at her sole disposal, for such charitable purposes as a majority of his Trustees should approve of, under the government of a Board of Directors, who may be regarded as responsible, not only for the due administration of the funds, but that the best and most approved systems of treatment shall be pursued. The internal arrangements, and the means of restoring the insane to reason—or, if that be impossible, to greater tranquillity and happiness than can be secured to them elsewhere—have been confided to Medical and other Officers, whom the Trustees have selected on account of their high characters and great experience, whose reputation depends upon the amount of benefit they have in their power to confer, and whose interest it is to render the proportion of recoveries as great as possible. Besides this guarantee, that every exertion will be made which art, or experience, or humanity, may suggest, the Rules have been so framed that, while all publicity will be given to the treatment employed, the strictest secrecy will be observed as to the persons who are treated. The position of the Asylum, the ample provision for the reception of Patients belonging to the higher ranks, and the class of attendants engaged, still further assimilate it to the most eligibly placed, and judiciously regulated, private establishments.

* See HILL'S *Lecture to the Governors of the Lincoln Asylum*, an establishment already noticed in our pages.

The great principles upon which this Institution will be conducted are justice, benevolence, and occupation; and by the application of these, the Patients, in so far as is consistent with their condition, will be induced to regard the Asylum as a home, and those to whose care they are confided as friends and companions. The Resident Medical Officer and Matron will associate constantly with the Patients; direct their pursuits and employments; suggest and join in their amusements; conciliating their affections, and obtaining their confidence, by treating them on rational and enlightened principles; by undeviating kindness, and by a scrupulous attention to the gratification of all their desires, whenever these are compatible with, or conducive to, health and tranquillity. They are intrusted, according to their experience, and to the state and stage of the disease, with the care of one, four, or ten Patients, whom they are not permitted to leave for a single moment, and whom they are enjoined to soothe, encourage, amuse, or employ; their presence and personal attentions rendering restraint, to a great degree, if not altogether, unnecessary. Whenever coercion is unavoidable, solitary confinement, in padded rooms, is resorted to, in preference to any of the other modes of physical restraint, which have been so long in use, as being of a more depressing and less irritating character, and in no way interfering with the perfect performance of all the bodily functions.

Divine service will be performed twice every Sabbath; and where the condition of individuals may render it inexpedient for them to join in a public ordinance, religious consolation will be administered in private.

The internal arrangements, and the means of restoring the insane to reason, (or, if that be impossible, to greater tranquillity and happiness,) have been confided to medical and other officers, among whom we find the name of Sir Andrew Halliday, K. H., a gentleman distinguished by his truly kind and benevolent disposition, united to a profound and scientific knowledge of his profession, and more particularly of that part of it which relates to the diseases of the mind.

THE LAND OF BEAUTY.

"A world, where there falls no blight!"—Mrs. Hemans.

There's beauty in the earth:
When spring its verdant mantle spreads;
And starting from their incense beds
The joyous flowers all round are seen,
Spangling, like gems, the robe of green
That earth now wears—when bursting free
The buds of hope adorn the tree,
And echoing with the wild-bird's song
The leafy woods resound along!
There's beauty in the earth!

There's beauty in the deep:
When milder than the soft repose
That steals from weary man his woes;
And brighter than the sunny glade
Its waters calm in peace are laid:
Or glittering in the golden ray
Of setting sun they sportive play,
And sparkling leap unto the sky
As though their joy they'd testify—
There's beauty in the deep!

There's beauty in the sun:
When full in glory's might he sheds
His lordly splendour o'er our heads,
And glowing with meridian light
Defies the glance of mortal sight;
Or now when in the lovely eve
Of summer's day his glories leave,
And sinking slowly to his rest
He seeks the mildness of the west—
There's beauty in the sun!

There's beauty in the sky:
When silent in the hour of night
The moon pours forth her silvery light,
And heaven, a sheet of tinted blue,
Is brighter than the sapphire's hue;
And stars unnumbered shine above,
Like angel ministers of love
Regarding with a thousand eyes
Man and his wayward destinies—
There's beauty in the sky!

* * * *

The beauty of the earth
Is seen but short—and blushing spring
Departs with early-flying wing;
The lovely flow'rets sink in death
Before the winter's icy breath;
The bud and blossom fall away
And fade, and fret, in slow decay,
And silent soon the woods become,
The song of harmony unknown—
What beauty in the earth?

The beauty of the deep:
Alas! how treach'rous is that rest,
Which now is spread on ocean's breast;
As though the placid-smiling sea
Could never falsely traitor be;
When swelling with its angry roar
The hapless bark it washeth o'er;
And far below in coral cave
The white bones find an ocean grave—
What beauty in the deep?

The beauty of the sun:
At noon-tide heat we shun his ray,
Burning and blasting with decay
The choicest flower—the brightest gem
That shines in earth's fair diadem;
At eve we see his parting beam,
How pale! how chilling it doth seem!
Like words, when charity's forgot,
It shineth but it warmeth not—
What beauty in the sun?

The beauty of the sky:
Not even *this* can satisfy,
The grandeur of the vaulted sky;
For threat'ning shower, and murky cloud,
And wrathful storm, and thunder loud,
Their fury raise and snatch from view
The glories of its brilliant hue;
And though we strain each eager eye,
We can but clouds and mists descry—
What beauty in the sky?

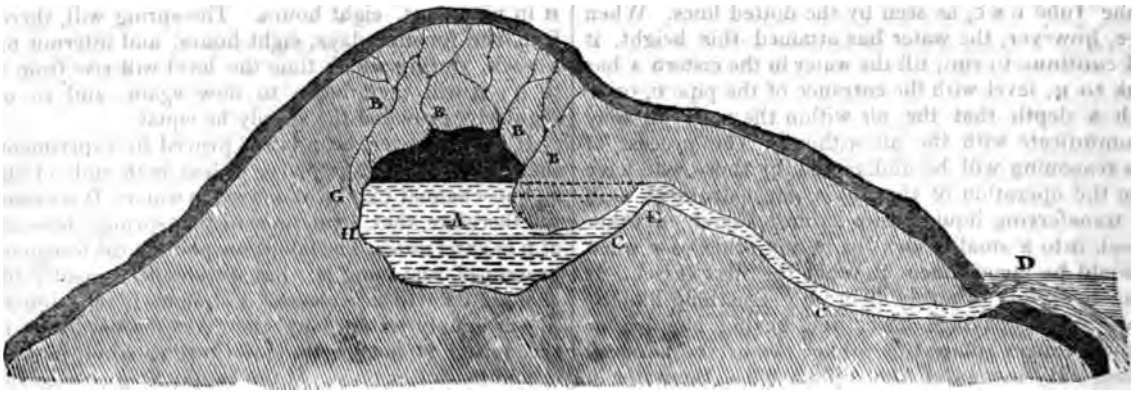
Where then is beauty found?
There is another country, where
The bloom excels the brightest here;
The waters, purer far than those
Which evening-dew hides in the rose;
The sun ne'er sets, nor fainter shines—
The glory fades not—nor declines
The fragrance of that heavenly shore,
Its joys—its bliss for evermore.
Here! here is beauty found!

Youghal, Ireland. S. H.

Learn to feel the supreme interest of the discipline of the mind;—study the remarkable power which you can exercise over its habits of attention and its trains of thought; and cultivate a sense of the deep importance of exercising this power according to the principles of wisdom and of virtue. * * * * Judging upon these principles, we are taught to feel that life has a value beyond the mere acquirement of knowledge, and the mere prosecution of our own happiness. This value is found in those nobler pursuits which qualify us for promoting the good of others, and in those acquirements by which we learn to become masters of ourselves. It is to cultivate the intellectual part for the attainment of truth,—and to train the moral being for the solemn purposes of life, when life is viewed in its relation to a life which is to come.—Abercromby.

The South American Indians are extremely hospitable, and I was delighted to see the readiness with which food and drink was offered to the stranger. An Indian visiter, naked and armed for the chase, on coming into a hut, says to the man dozing in his hammock, and who may never have have seen him before, "Prooha meroo," (I am come,) to which the other replies deliberately, "Cherre," (sit down,) and no other introduction is required, but food and lodging immediately tendered.—Capt. Alexander.

INTERMITTING SPRINGS.



SECTION OF AN INTERMITTING SPRING.

THERE are some springs, which flow copiously in winter or wet weather, while in summer or dry weather, they partially or entirely cease; others, on the contrary, flow during the driest weather, and ebb when there is much rain; and some springs there are, which have periodical ebbs and flows, apparently unconnected with the weather or seasons, but always occurring at regular intervals, sometimes of a few seconds only, and at other times of as many weeks. In some cases of the last kind, the increase of the water is quite certain and regular; while in others, it is so irregular and uncertain, that it is impossible to foretell when such springs will begin or cease flowing. All these kinds of phenomena are called *intermitting** springs: but, perhaps, this term is strictly confined to those springs which flow for a while, and then cease; then flow again, and so on; for those which are always flowing, but have a periodical swell or increase, are more properly named *variable* springs.

Before we inquire into the causes of intermitting and variable springs, the reader must be made acquainted with the reasoning by which the phenomena of springs, generally, are now accounted for. When we consider the large number of rivers in the world, and the immense quantity of water poured into the sea by every one, the most insignificant of these rivers; and that all this water comes out of the ground by springs; the question naturally arises, whence does this water originally proceed? What keeps the spring always supplied?—Again, another question occurs;—what becomes of this water after it enters the ocean, which certainly manifests no increase in consequence of the immense volumes of liquid always pouring into it? Now in order to account for both these subjects of wonder, the most easy explanation, and therefore that which first suggests itself to the mind, is obviously that the water finds its way back from the ocean to the springs, just as fast as it flows from the springs to the sea. Thus the water is taken away from the sea, as fast as it enters; so as to prevent either increase or decrease in that body; and this water is returned to the springs to keep them always supplied. Such a conclusion must have occurred to King Solomon, the Sacred Preacher, who says, "All the rivers run into the sea, yet the sea is not full; unto the place from whence the rivers come thither they return again." *Eccles.* 1. 7.

But a body cannot be kept *always* in motion, without some maintaining power; and that which serves in the present instance, to keep up the continual circulation of water, is *the heat of the sun*, which, acting on the surface of the sea, rapidly evaporates the water. This evaporation, in the Mediterranean, is much too rapid to be compensated by the numerous rivers which flow into it; and hence, there is always a strong current coming in from the Atlantic through the straits of Gibraltar, to supply the waste occasioned by evaporation. All this water, raised up in the form of vapour, forms clouds, which are driven along till they arrive at a climate too cold to preserve them in an aëriform state. They then condense into drops, or solid flakes; and being too heavy to be supported in the air, they fall, and constitute rain, hail, or snow. This, after performing its various useful offices, fertilizing the earth and feeding the vegetable world, penetrates into the soil, and descends through various soils and rocks into the bowels of the earth. Here it forms caverns and vast reservoirs for its reception, from whence it flows through subterranean channels, till it issues out at the surface in the form of springs, which uniting, make the source of the different rivers of the world, which supply to the sea what it loses by evaporation. Thus, the water, with which the earth is stocked, may be compared to the blood of an animal. The ocean is the heart; the clouds are the arteries that carry it out and diffuse it gradually over the earth to discharge all its useful and necessary functions, which are no sooner accomplished, than the brooks and rivers act as veins, and restore it to the ocean. This great reservoir is plentifully stocked with salt, to preserve the great inert mass of water therein from putrefaction; but the showers and springs are destitute of salt, because the *pure* water only is raised up from the sea by heat: all the salt remains behind in the sea, as in a still.

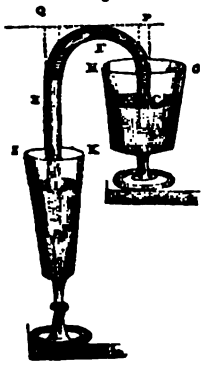
The phenomena of *intermitting* springs were first explained by Dr. Atwell, who was induced to examine into their cause by seeing a curious *variable* spring at Brixam, near Torbay, in Devonshire. The following is the manner in which he accounts for springs, which flow at certain regular periods, and during the intervals are quite dry.

Let the above figure represent the section of a hill or mountain, with its thin covering of vegetable mould, the internal part being composed of chalk, clay, stone, or some other stratified rock, and having a hollow cavern A, which is supplied with water filtering down through the *runners* B B B B, which are crevices or pores in the rock, which receive the rain or snow-water after it has been absorbed by the external soil. The only outlet from this cavity is by the subterraneous passage C E C. Now according to the simplest law of hydrostatics, that *water does not*

* The term *intermitting* implies, according to its derivation from the Latin, that which *leaves off for a while, and then begins again.*

rise above its level, the water cannot run out by the channel C E C, until it has risen in the chamber A to the level of the line G, or level with the lower bend E, of the tube C E C, as seen by the dotted lines. When once, however, the water has attained this height, it will continue to run, till the water in the cistern A has sunk to H, level with the entrance of the pipe C, or to such a depth that the air within the reservoir may communicate with the air without. The process of this reasoning will be understood by those who have seen the operation of the *siphon*, an instrument used for transferring liquids from a large barrel, or other vessel, into a smaller one; or in any other case when it would be inconvenient to move the first vessel. It consists simply of a tube bent into something like the shape of the passage C E C, and having one leg or branch longer than the other; as in the annexed figure. By means of the siphon B F A, the water in the upper vessel may be transferred to the lower. To effect this, the leg, which is inserted in the water to be removed, must be shorter than the other; so that the level of the water in the vessel I K, may be beneath the level of the water in H *c*. The water will thus keep on running from the upper vessel into the lower, as long as the column Q E D is greater than P C. Now, in this case, in order to set the siphon to work, it is necessary that it should be previously filled with water, or if we exhaust the air with the mouth, a vacuum is left in the upper part of the tube. The pressure, therefore, of the atmosphere on the surface of the water in the vessel, is not counteracted by any equal pressure within the tube; and consequently it forces the water up over the bend, when it falls out. As this process is continually repeated, a constant stream is kept up through the siphon, until the water in the vessel has sunk so low, that the lower end of the shorter leg is left uncovered by the water. Of course, the transfer of the water must then cease*. On this principle cups are sometimes made, which hold the water very well until it rises to a certain height, when they at once discharge the whole of their contents. These cups contain a siphon, the opening of whose shorter leg is near the bottom of the cup. When water is poured into such a cup, it cannot run out until it attains a height level with the bend of the siphon. It will then commence running, and continue to do so, till the water has sunk to the mouth of the shorter leg, and the vessel is nearly empty.

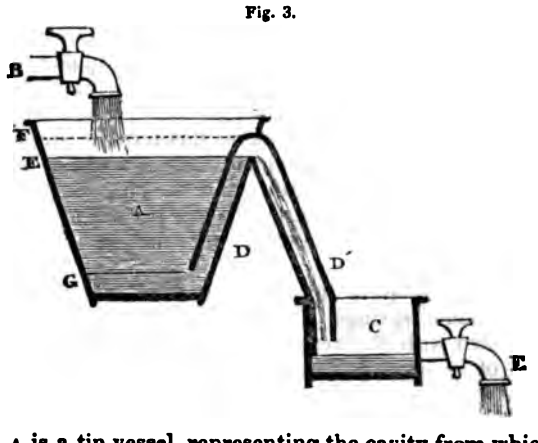
Fig. 2.



Now the *intermitting* spring was said to act *exactly* like this cup; and although the supply from above into the cavern A is gradual and equal, yet the water runs out through the channel C E C only at periodical intervals, and then more quickly than it enters. The passage C E C must, of course, be large enough to carry off the water more rapidly than the runners B B supply it; or else the level of the water in the reservoir A will be always the same, and the spring will not *intermit*, or cease flowing for a while. The length of the intervals will depend on the capacity of the reservoir, or the difference between the levels G and H. Suppose it requires a week for the runners B B B to fill the reservoir from H to G, and that the passage C E C would empty the cavern from G to H in four days, if the runners did not give it any fresh supply; then, when both the filling and emptying passages are in action, the level will sink from G to H in nine days, eight hours. The spring will, therefore, run for nine days, eight hours, and intermit for a week, during which time the level will rise from H to G; it will then begin to flow again, and so on regularly, provided the supply be equal.

It has, however, been lately proved by experiment, that this will not take place, unless both ends of the siphon-channel C E C be immersed in water. It is essential therefore, that, in an intermitting spring, *the mouth at D be under water*. The fallacious point in the foregoing process of reasoning is, that we should consider the channel C E C to be *necessarily* a siphon. If the runners B, &c. supply water faster than it is discharged at D, the spring is not of the intermitting kind, and is accounted for at once. If the supply at B correspond with the stream at D, the water will continue to flow in the same uninterrupted and equable manner, as soon as it once turns the lower bend E; and the supply from B cannot fall short of the discharge at D, for the water which flows over E, the lower bend of the channel, must, in these two cases, correspond with that which descends from B. In the two last suppositions, the level of the water must always coincide with the lower dotted line, which runs to E. To prove all this a model has been constructed, which is shown in this figure.

Fig. 3.



A is a tin vessel, representing the cavity from which a spring issues. This is equably supplied with water by the cock B, answering to the runners. The water from this vessel can be discharged into the lower vessel C, by the syphon-tube D D′, which is rather larger than the cock B. Another cock E, equal in size to B, is provided to the vessel C. Now when this cock E is open, the water flows out of it, just as fast as it flows down from B; the level of the water being at E, and just coinciding with the lower bend of the siphon D D′.

The water thus retains its level in A, and just dribbles over the bend of the tube D, uniformly and without interruption, as fast as it is supplied from B. When, however, the cock E is closed, the level of the water in C rises till it covers the mouth of the tube D, and then all the phenomena of intermitting springs are imitated. However equal the supply from B may be, the spring in C ebbs and flows alternately, and the level in A fluctuates between F and G. When this level is descending, the spring flows much more rapidly than the supply at B; and when the level in A is ascending, the spring does not flow at all. The same effects would of course result, if the cock E were left open, but were placed above the level of the mouth of the tube D′.

The exactness with which such a model, when con-

* For a fuller account of the properties and uses of the Siphon, the reader is referred to an article at page 213, Vol. XII., of this work.

cock E is closed, imitates all the phenomena of natural intermitting springs, is truly surprising. Even the bubbles of air which attend the beginning of their flow, are repeated on a small scale with the model, and arise from the air which gets into and fills the siphon D D′, when, at the termination of the flow, its mouth is uncovered by the water in A, which has descended to the level of G. During the rise of the water in A up to F, part of this air is driven out into C; and, if the lower mouth of the siphon be under water, it escapes in bubbles. As soon as the water in A has attained its highest level, the remaining part of this air is driven out, and then the flow re-commences. The water gushes abundantly over the edge of the cup C, and the discharge so greatly exceeds the supply from B, that in less than a minute it empties the vessel A down to the level of G. A fresh supply of air then rushes up into the siphon, which was before full of water; the flow of water from C entirely stops, and does not re-commence until the water in A has again risen to its utmost height F, when the same process is repeated.

The beautiful action of this model, when the lower end of the tube D′ of the siphon is under water, and its entire failure when, by opening the cock E, the mouth is left uncovered by the water, clearly prove that it is essential to all intermitting fountains, that their orifices should be in the bottom of a basin, well, or brook, so as to be always under water: yet this most important and necessary condition was quite unnoticed, or overlooked, till very lately, when MR. WHARTON, of Durham, proved it by this experiment. This gentleman exhibited the model, of which we have given a section, at the last meeting of the British Association: but no account of it, as explanatory of the new theory of intermitting springs, has hitherto been published.

AMERICAN HOTELS, TAVERNS, BOARDING-HOUSES, AND HOUSES OF ENTERTAINMENT.

UNDER the above four heads are classed the whole range of "places of accommodation," throughout the United States of America. Although, in a few instances, the traveller will meet with humble cottages, over the door of which, "cakes and beer," or "cakes and cider," is written in rude and unpretending characters, and not in "letters of gold;" yet these are so few, and of so unpretending an order, that they are never reckoned upon as coming within the general range of places of rest and accommodation for the plodding wayfarer, or for those whom business or pleasure induces to take long journies through the country. In the eastern and middle States, you sometimes meet with the word "Inn," inscribed on a swinging board attached to a tall sign-post by the side of the road; but one might wonder how this should happen, since the inhabitants invariably speak of such "inns" as *taverns*; coupling therewith the name of the occupier, as Green's Tavern, &c., but on no occasion applying the term "inn."

Hotels may be considered as taking precedence of the rest; although, in the principal towns and cities, there are "boarding-houses," where the charges for board and lodging are pretty much upon a par with the charges at a first-rate hotel. Indeed, there seems scarcely any reason why they should not be precisely similar, since the company at both sit down at public tables, where the viands are of the same kind and *quality*; the only difference being this,—that the hotel-keeper takes out a license to retail wines and spirits, charging thereupon whatever profit he pleases; while the keeper of the boarding-house (being unlicensed) professes to purchase the wines and spirits his "boarders" may wish for, from some neighbouring store, without charging anything for the trouble of so doing. There is not, however, much difference in the prices of liquor and wine, since at any of the *genteel* establishments you will be charged about two dollars (8*s*. 4*d*.) per bottle for port and sherry, for good Madeira three dollars, and for other wines in proportion. Twelve dollars the week is the usual price of the respectable hotels and boarding-houses in the Atlantic cities of the eastern and middle States; in the cities of the southern States, the charges are considerably higher. In the interior of the country, the term Hotel is by no means confined to establishments of the first order; for where the country is *new*, and as yet but thinly inhabited, you frequently see wooden buildings, but partially enclosed with planks or weather-boards,—with old straw hats and bonnets in the holes in the windows where glass ought to be,—and yet some lofty sign-board informs you that it is "The Washington," "The Franklin," or "The Citizen's Hotel."

Since it is the custom in America for the company to assemble at a public table, there necessarily is a very "lengthy" dining-room attached to each of those establishments in populous places. There the "boarders" (for persons remaining but a single day are styled "boarders") assemble three times in the day; and those who indulge in that not very general custom in America, of eating supper, repair a fourth time to a table, where cold joints (the remains of dinner), shell-fish, &c., are paraded from nine to eleven o'clock every evening.

Boarding-houses require no particular description. They are, in fact, nothing more or less than hotels or taverns, without licenses to sell wines and spirits; but where the "boarders" can be supplied with these articles in all their varieties; and whether they are supplied from the "bar" of an establishment, or from some neighbouring store, signifies but little to the guests, provided the articles have price and quality to recommend them, and are at hand in due season.

In consequence of the very common custom amongst the Americans, of sojourning at *private* boarding-houses, there are, comparatively, few hotels or *public* establishments in the towns and cities. Strangers, however, usually resort to the latter on their first arrival; but should they be likely to sojourn for a few weeks, or months, many of them change their quarters, and remove to one of the "private boarding-houses." But many of these establishments have their daily "comers" and "goers," as well as the hotels and taverns; for should you be staying but for a single day, these establishments will willingly receive you and your luggage, provided they be not already full of company. Like the hotels, they have their prices per day, as also by the week; and, according to the style and pretensions of the establishment, you will be charged from three shillings to half a guinea for a day's "board and lodging." In the interior of the country, the charges are much lower, since, in the most respectable establishments the inland towns afford, from three to four dollars (13*s*. to 17*s*.) per week are the customary charges for boarding—lodging, as a matter of course, being included; without any additional tax in the shape of fees to the servants of the establishment.

The next order of *public* establishments is taverns. This includes a great majority of what we should designate country inns and ale-houses. Taverns, like

the hotels, pay a tax to the state; and, consequently, retail such wines and liquors as may appear best suited to their customers. Twenty years ago, scarcely any of the country taverns dealt in malt liquor of any description; cider, and indifferent whiskey, distilled from raw Indian corn or rye, constituted their whole stock in trade. But the case is now altered, and there are very few of these country establishments, having any pretensions to respectability, that do not afford ale or strong beer; and it may be remarked generally, that this beverage is becoming popular amongst the Americans. Establishments of this order possess neither parlours nor coffee-rooms; a large naked room, adjoining the bar, and called the bar-room, is the only place where any drinking goes on; and there it is much after the manner of the English gin-shops. There it is not the custom to sit sotting for hours over a pot of beer, or a glass of liquor; what is called for is drank standing at the bar, and should the parties happen to be of the tippling order, they will seat themselves in some part of the large uncomfortable room, until they feel disposed to indulge in another "drink," when they again approach the bar, and swallow, instanter, that which they call for; being charged so much per "drink," the liquor not being measured out to them; for the bottle or decanter containing the spirits (or wine) is placed by the side of a tumbler, the party being allowed to help himself—to much or to little—for which he is charged the customary price of a "drink."

The country taverns depend more upon the profits arising from the sale of "victuals" than "drink;" for, in the villages in the new settlements, the young men employed in the stores, as well as the journeymen mechanics, and frequently married people too, "board" at the taverns. As for those situated upon the various roads intersecting the country, they are mostly at such distances from the villages, and, also, from each other, that travellers find it both convenient and necessary to partake of some refreshment, or to obtain a lodging for the night. A good and substantial meal will be charged from nine-pence to a shilling, and for a comfortable bed six-pence.

Houses of entertainment yet remain to be spoken of. Few of these have any "outward sign" of affording the weary traveller food or rest. In some instances, however, a piece of chalk or charcoal, applied to a rough board, informs the wayfarer that "hay and oats are sold here;" or, that there is "accommodation for man and horse." The parties who hold out those "public hints," do so, no doubt, with a view of making a profit upon their farm-produce, &c. But there are many that hold out no intimation of being willing to accommodate travellers, whose houses, in process of time, acquire the name of houses of entertainment. These persons usually profess to have opened their houses for the convenience of the public, rather than for their own gain; and yet their charges are precisely the same as those made by the tavern-keepers in the same section of country. Having no license to sell spirits, it is expected that a stranger will be able to subsist upon such "victuals" as the house affords, accompanied, in most cases, with a little indifferent cider. These houses of entertainment are mostly the abodes of farmers of some standing,—of persons who have been able to make their farms yield more than sufficient of the necessaries of life for the maintenance of their families; which is, by no means, a very common case in the recently-inhabited districts of the continent of North America.

HARVEY,

THE DISCOVERER OF THE CIRCULATION OF THE BLOOD.

Few men have rendered such valuable service to the human species as Dr. William Harvey, a physician who flourished about two hundred years ago. It was he who fully demonstrated, for the first time, that the blood is in constant circulation, so long as life exists; and by this discovery he gave to the medical practitioner a mighty engine by which to regulate his proceedings, in the event of illness; for it is obvious that the treatment of diseases must be very different on the supposition that the blood circulates, and on that that it is stationary.

William Harvey was born at Folkstone in Kent, on the 1st of April, 1578. He received the rudiments of education at Canterbury, and then went to Caius College, Cambridge. At the age of nineteen, after having devoted six years to scientific study, he went abroad for improvement, and attended the lectures of Fabricius on anatomy, of Minadous on pharmacy, and Casserius on surgery, at Padua. In 1602 he returned to England, and six years afterwards was elected Fellow of the College of Physicians, and Physician to Bartholomew's Hospital. In 1615 he was appointed to read lectures on anatomy and surgery at the college, and began then to develope his views respecting the circulation of the blood.

It appears that the manner in which Harvey was led to the adoption of his opinions, was from the contemplation of certain valves which exist in the veins, and which are so formed that a liquid, such as the blood, could pass through them in one direction, but not in another. Now every one who reflects for a moment on the wonderful and beautiful productions of nature, must be conscious that nothing is created in vain. Everything has its use, according to some wise ordination. Harvey, impressed with these ideas, respecting the works of creation, concluded that the valves in the veins were formed in the manner which has been described, for the purpose of admitting the blood to circulate through them in a particular direction.

Before Harvey's time the most confused and contradictory opinions prevailed as to the functions of the blood. Some thought that it moved from the lungs to the heart along certain air-tubes, and mixed with the air, while others thought that it trickled through minute pores. But Dr. Harvey made attentive observation, both during life and after death, and formed his opinions from a great variety of circumstances. He found that the heart has periods of action and of rest, but that in warm-blooded animals its motions are so rapid, that the different steps of them cannot be distinguished. In cold-blooded animals they are slower. The heart is raised during its action, and the pointed end is turned forwards. It contracts in every direction, especially at the sides. These and many other circumstances, which are too difficult for popular explanation, led him to the promulgation of the opinion that the blood is in constant circulation.

This opinion speedily excited the attention of anatomists in every part of Europe. Primirosius, Parisanus, Riolarius, and other foreign anatomists, violently opposed his opinion. To some of these he replied, but others he left unanswered, from disgust at their violence. During the whole of the contest he behaved with the nobleness which belongs to a man who knows that he is in the right; and by degrees he had the satisfaction of seeing his old enemies, one by one, turn round and embrace his opinions. When it gradually became admitted that the circulation of the blood was the correct theory, his enemies attempted

to deprive him of the honour, by saying that it had been discovered before his time. Some said that it had been discovered by Father Paul, of Venice; others attributed it to a Spanish physician, Servetus, who was afterwards burned for heresy by Calvin; while a third party went so far back as the time of Hippocrates, to find the discoverer. But every succeeding year, and every succeeding advance in science, proved more clearly Harvey's claim to be considered as the real discoverer of the circulation of the blood.

Harvey was appointed Physician Extraordinary to King James the First, and, in 1632, Physician in Ordinary to King Charles, by whom he was much esteemed, and who furnished him with many specimens of animals on which he could make such observations as might further his other investigations. During the civil wars he adhered to the court party, and travelled with the king; and while staying for a short time at Oxford, he was presented by the king with the mastership of Merton College, in the place of Dr. Brent, who had taken the opposite side in politics, and left the university. But when Oxford surrendered to the parliamentarians, Brent resumed his former office, and Harvey retired to the neighbourhood of London.

He then published some anatomical and physiological works, which greatly raised his reputation, already beginning to be appreciated by his researches in the circulation. But his labours were much retarded by the plunder and destruction of his valuable museum, by his political adversaries, while he was in the king's service. This is not the only instance which we have of the destruction of valuable scientific collections, during the heart-burnings of political events.

In 1652 his brother-collegians erected a bust to his honour, in their hall; in return for which he built a library and museum for the college. As old age crept upon him, he was subjected to distressing attacks of the gout, which contributed to imbitter his existence so much, that he is said to have shortened his days with a dose of opium. He lived during the latter years of his life at his country-house at Lambeth, or with his brother near Richmond. He died on the third of June, 1657, in the eightieth year of his age, and was interred at Hempstead in Essex, his funeral being attended by all the fellows of the college to which he belonged. He died in possession of the esteem and respect of his contemporaries, and has secured the admiration of posterity.

We may here give a very brief view of the nature of the circulation of the blood, the great problem which occupied so much of the attention of Dr. Harvey.

The primary machine by which the blood is set into circulation is the heart, and it is conveyed through pipes or conduits, to every part of the body; the pipes becoming smaller or finer, as they ramify towards the extremities of the system. What is the first action that sets the blood into motion is a mysterious question; but when once the motion commences, it proceeds in a regular order. The blood is conveyed from all parts of the body into the right auricle of the heart, through the veins, and from thence it is propelled into another part of the heart, called the *right ventricle*. From the latter position it is conveyed through an artery into the lungs, where it is purified by the action of the atmospheric air which we inhale into the lungs, and rendered fit to perform its functions again. It is then returned from the lungs into the left auricle of the heart; from thence into the left ventricle, and thence again it is sent to perform *its circuit throughout* the system.

Thus does this wonderful operation go on! The blood affords nourishment to the several parts as it flows along, and collects in its progress the impurities which may be met with in the system. So much is this the case, that when the blood is returned again to the heart, it has acquired quite a purple colour, by the substances, chiefly carbon, which it collects in its progress. When the blood is brought into contact with the air in the lungs, the oxygen of the atmosphere removes the impurities from the blood, and enables it to return to the heart, glowing with its wonted red colour.

It is said that each cavity of the heart contains from two to three ounces of blood; that the heart contracts four thousand times in one hour; and that, therefore, there passes through the heart, every hour, seven hundred pounds' weight, or eight thousand ounces of blood. The whole quantity of blood in a full-grown man is estimated at about twenty-five or thirty pounds; so that a quantity of blood equal to the whole mass in the body must pass through the body twenty-eight times in an hour.

In different individuals, and even in the same individual at different periods, the force of the heart's action, and the activity of the vessels are very various. In people of a low temperament the circulation is languid; in the sanguine it is quick. When hope enlivens, or prosperity encourages the mind, the vital current flows with ease and freedom; but grief or adversity slackens it. In youth the pulse is frequent; in middle age it is firm; in old age, weak.

There is no part of the human body, however remote from the heart, which is not abundantly supplied with blood; and of the minuteness of the vessels through which this blood is conveyed, we may form some conception from the fact, that a prick of the finest needle draws blood! We are not to imagine that there is a cell of blood occupying the middle of the finger, of the arm, or of any other part of the body, merely from the circumstance that a slight puncture so soon causes blood to flow. No: wherever we prick through the skin, we penetrate vessels whose minuteness almost exceeds belief, which vessels are filled with blood. Leuwenhoeck estimated, from microscopical observations, that every square-inch of the human body is traversed by at least one thousand distinct and separate vessels! What must be the minuteness of these exquisite canals! And in the progress of the blood through these minute channels, it deposits matter which conduces to the growth of all the several parts. The blood is the great reservoir from which all the solid parts of the animal frame are gradually formed. Where bone is wanted, it deposits a certain principle or substance which is calculated to produce bone: where muscle is required, a sort of fleshy fibre is left behind the blood in the course of its progress.

How do the works of man sink into insignificance when compared with such exquisite mechanism as that by which the circulation of the blood is carried on! Nothing superfluous—nothing wanting—every organ, and every part of an organ, having its appropriate and defined office, and all working together in harmony to produce one common end! If this is great and wonderful, the discovery of the fact is, and must necessarily be, of importance to man, and for this reason posterity will never cease to owe a debt of gratitude to Dr. William Harvey.

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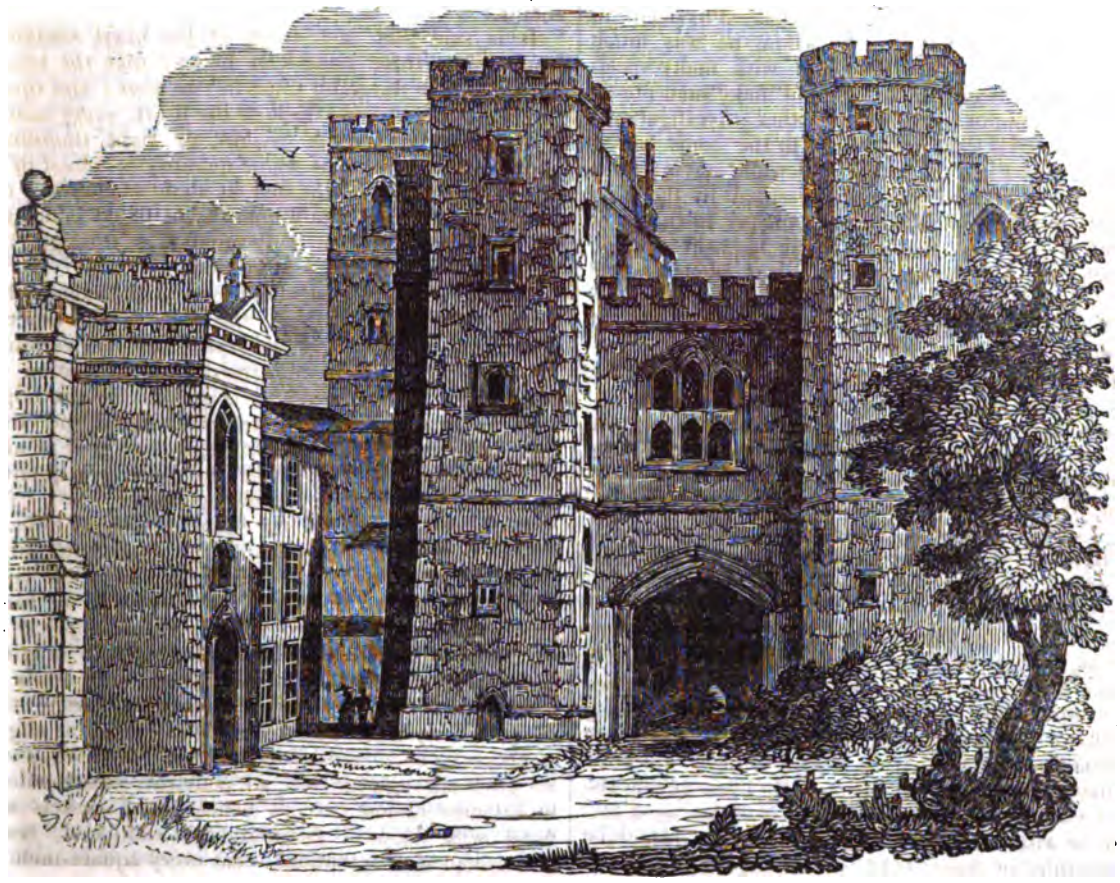
LAMBETH PALACE, AND ITS HISTORICAL ASSOCIATIONS. II.



THE COURT-YARD AND GATE-HOUSE, AT LAMBETH PALACE.

HAVING in our former article treated generally of the principal circumstances connected with the building of Lambeth Palace, we will now proceed to describe its interior arrangements, in as much detail as our limits will permit.

The palace is situated, as most persons are aware, on the Surrey side of the Thames, between Westminster and Vauxhall bridges; and is a large and irregular structure, as may be anticipated by the piece-meal manner in which it was built by so many successive archbishops. The whole of the buildings, together with the park and gardens, occupies an area of thirteen acres, and more resembles a town than a single residence.

The first part which we shall describe is the *great gate* in the entrance court-yard. The great gate is one of the most magnificent things of the kind in existence, principally on account of its large size. It consists of two immense square towers, with a spacious gateway and postern in the centre; it is built with fine red brick, with stone dressings, and is embattled. It was built by Archbishop Morton, about the year 1490. Over the gateway is a room called the "Record Room," in which the archives of the see of Canterbury are kept. The towers of the gatehouse are ascended by spiral stone staircases, which lead to apartments on different stories. From the roof of these towers, a most extensive view of the surrounding country may be obtained. The court-yard and gate-house are represented in the frontispiece.

There is a very ancient weekly custom of distributing the *dole* at this gate. In former times, the great and wealthy used to give alms to the indigent at the gates of their mansion, and this alms was often called *dole*. Many of the early English nobles were accustomed to distribute a certain amount of alms at their gates at certain periods; and it is not surprising that so high a personage as the Archbishop of Canterbury followed so laudable an example. Archbishop Winchelsey was accustomed, besides the daily fragments from his table, to give on Fridays and Sundays a farthing loaf (which was in those days sufficient for a day's food) to every beggar that applied; and there were seldom less than four thousand applicants every alms-day. This amounted to the value of five hundred pounds a-year, which was an immense sum in those days. Besides this, he used to give one hundred and fifty pence to the same number of poor persons, on every festival day, and to send food to those who were too ill to leave their houses. These

were indeed noble instances of charity. Dr. Ducarel says, that the dole given in modern times at the gate of the palace, consists of fifteen quartern loaves, nine stone of beef, and five shillings worth of halfpence. These are divided into three equal portions, and distributed every Sunday, Tuesday, and Thursday, among thirty poor parishioners of Lambeth. The beef is made into broth thickened with oatmeal, divided into ten shares, and is distributed with half of one of the loaves, a pitcher of broth, and twopence, to as many persons, who are thus weekly relieved by rotation.

The next part which we shall describe is the *library*. The court-yard contains the *gate-house* of which we have just spoken, and the great hall, of which we shall hereafter have to treat. On crossing the latter, we ascend the principal staircase and then enter the *library*, which occupies four galleries over the cloisters, forming a quadrangle thereby.

The library of each archbishop was his own private property, until the time of Archbishop Bancroft, who was the first founder of the present library, and who gave his books to his successors in the see for ever, a gift which was more distinctly stated in the will of his successor Archbishop Abbot, in these words:—

Lett all men present and to come know and understand, that Richard Bancrofte, doctor of divinitie, first Bishop of London, and afterward promoted to the Archbishopric of Canterbury, being for many years a great gatherer together of bookes, did voluntarily and of his owne action (as in his lifetime he had often foretold he would), by his last will and testament give and bequeath unto his successors the Archbishops of Canterbury for ever, a greate and famous library of bookes of divinity, and of many other sorts of learning, but with request and entreatie, that the King's majestie, within the space of two years, would graciously take order that these bookes might safely be continued to posterity, that so the good and religious intention of him that was the bestower might not be frustrated and annihilated.

The books thus deposited and bequeathed, remained in the library till 1646, two years after the execution of Archbishop Laud, when they were seized by the Parliament, and granted to Dr. Wilcocke, for his use. They were afterwards granted to Sion College, and as there seemed reason to fear that they would be dissipated, the learned Selden suggested that by a particular clause in Bancroft's will, they might be claimed by the University of Cambridge. This claim was allowed by Parliament, and the books were removed to Cambridge.

Archbishop Juxon, when the troubles of the Protectorate were ended, demanded the books again, in right of the see; and this demand was acceded to, as well as that for the restoration of some of the books which had got into private hands. From that time the books have occupied their present situation, their number amounting to about twenty-five thousand. The library is particularly rich in works connected with divinity, as may be supposed from the high office held by the archbishop. It is also well supplied with early works relating to general literature. Of modern works there are, of course, very few, arising from the manner in which the books have been collected and bequeathed. Bancroft, Abbot, Laud, Sheldon, Tennison, Parker, Secker, Cornwallis, and Moore, are among the archbishops who have contributed to the formation of the library.

The library contains some well-arranged catalogues of the books which it contains, and boasts of having had many learned men as librarians; among whom were Dr. Wharton, Dr. Gibson, afterwards Bishop of London, Dr. Ibbot, afterwards Prebendary of Westminster, Mr. Hall, and Dr. Ducarel.

In the library are a few paintings, portraits of distinguished individuals; and in the windows of that part which is used as a study, are some admirable specimens of stained glass, containing the arms of Archbishop Bancroft, of Archbishop Laud, and of Philip the Second of Spain; and the portraits of St. Augustine and of Archbishop Chichely. Under that of St. Augustine are the following lines—

So careful of his chardge, soe meeke a minde,
Soe deeply learned, so Christianlye inclin'd;
And one that heretickes did more confound,
Since the Apostles tyme hath not beene found.

Among other curiosities in the library is the shell of a land-tortoise, which is said to have been put into the garden at Lambeth by Archbishop Laud in 1633, where it continued till 1753, when it was unfortunately killed by the negligence of the gardener. The shell was preserved through the care of a Mr. Thomas Parry, who was receiver of the archbishop's revenues. The known longevity of the tortoise gives an air of probability to the statement as to the age of this specimen.

We must now leave the *library*, and proceed to the *guard-room*, which is parallel to the west side of it, and measures fifty-six feet by twenty-seven. There used formerly to be armour and arms belonging to the palace, for its defence, and this was the room in which they were kept. The arms appear to have been the private property of Archbishop Parker, and to have been purchased by the successive archbishops from the executors of the preceding holders of the see. When the palace was plundered, during the civil war, these arms were, as may be supposed, made part of the spoil, but were restored again after the Restoration. The guard-room was in existence as long back as the year 1424. It has been supposed that a convocation was held in this room by Archbishop Kemp, in 1452, and that Archbishop Laud also kept his solemn consecration-feast in this room, in 1633, in the midst of his household. This room is distinguished by a very venerable timber roof.

The *presence chamber* is a room thirty feet by nineteen, and in it was formerly conducted the ordination of priests and deacons. The windows have acquired a celebrity from the stained-glass which they contain. In one is a portrait of St. Jerome, or St. Hieronimus, with the following verse:—

ST. HIERONIMUS.

Devout his life, his volumes learned be,
The Sacred Writt's interpreter was he,
And none ye Doctors of the Church amonge
Is found his equal in the Hebrew tongue.

On another window is a portrait of St. Gregory, under which is the following verse:—

GREGORIUS.

More holy or more learned since his tyme
Was none that wore the triple diadem:
And by his paynefull studies he is one
Among the cheefest Latin fathers knowne.

He lived about the year of our Lord, 594.

In an adjoining *lobby* are portraits of Henry, prince of Wales, Martin Luther and his wife, Dr. Whicheot, Archbishop Sancroft, and M. Dupin, a French ecclesiastical historian. There is an old *drawing-room* near this lobby, which used to be called "le velvet room," from its being hung with purple and red velvet; and from this room there is an entrance to *the long gallery*. This is a noble room, ninety feet long by sixteen feet wide, and runs parallel with the eastern end of the chapel, terminating the range of apartments on the south side of the palace, and merits particular attention for the fine collection of portraits of primates and prelates with which it is adorned.

The first mention of this gallery is contained in Archbishop Parker's will, in which he gives to his successors, for ever, the pictures of Bishop Warham, and of Erasmus, in his gallery. They were then valued at 6*l.* Archbishop Grindall bequeathed them to his next successor. Whatever addition might have been made to the number of the pictures afterwards, Archbishop Laud gave them to his successors, as appears by this clause in his will:—"As for the pictures in the gallery at Lambeth, I leave them to succession, as well those that I found there, as those which I have added."

The gallery itself appears to have been built by Cardinal Pole, of whom an admirable portrait forms a conspicuous object in the gallery. It is a copy from the original picture in the *Barberini* Palace at Rome; it is the size of life, and represents the cardinal seated in the splendid habit of his order, the scarlet of which is peculiarly bright and glowing. Among other pictures in the gallery are, a portrait of Archbishop Arundel, in the time of Henry IV.; portraits of Warham and Erasmus, by Hans Holbein; a portrait of Archbishop Parker, by Richard Lyne, an artist of merit, who, together with two engravers, were constantly patronized and employed by the Archbishop; of Martin Luther; of Cranmer, Whitgift, and Grindall; of Abbot and Chichely. There are, besides, portraits of many other distinguished men, among whom are Gilbert Burnet, the author of the "History of his own times;" Bishop Haugh, of Worcester; Bishop Lloyd, one of the seven prelates committed to the Tower by James II.; Catherine Parr, and others.

There are some beautiful specimens of stained glass in the windows of the gallery, containing the arms of many of the archbishops; particularly in one called the *bow*-window, in which are depicted the arms of all the Protestant archbishops from Cranmer to Cornwallis.

There are some more remarkable paintings in another room, called the *vestry*. One of these is supposed to represent Archbishop Juxon after death: it is an emaciated figure in bed, with a cap nearly drawn over his eyes, and apparently dead. Another old painting, on panel, represents a male and female, said to be portraits of Martin Luther and his wife. The figures in this picture are beautifully painted, and have a very natural air. The man wears a cap of the form common to the age of Henry VIII., and is regarding the female, whose hand he holds, with a look of great satisfaction. The lady has a sort of Dutch face, but is handsome and fair. Another portrait in this room is one of Cardinal Pole.

The *cloisters* stand on the south side of the chapel, their north side being bounded by the great hall, and their eastern and western sides by the guard-room and the Lollard's tower. They include an area of but small dimensions, and are apparently a few years older than the library, which is over them. Their sides are plain, and the ceiling flat, composed of common laths and plaster. They serve as avenues to the various parts of the palace.

There were formerly both great and little cloisters; but the latter were pulled down in the last century. They stood on the north side of the chapel, were covered and floored with tiles, and supported by twelve pillars. They extended from east to west, parallel to the north side of the chapel, and extending up to the garden wall.

In our next article on this subject, we shall describe the noble apartment known as the *great hall*.

PERRANZABULOE.

II.

To the reader who may have felt a pleasing interest in the several matters relating to the restoration of the old church of Perranzabuloe*, it will not be less interesting to hear, that within a few yards of its southern side has been discovered a building, which in all probability was the very "cell" in which the pilgrim saint resided. The walls are of the same thickness and construction as those of the church, and are evidently of the same age. They form but one small apartment, having neither window nor chimney, and but one doorway. It may have been the humble dwelling of the priest attached to the church. The ground, to a considerable extent around the church, especially on its southern and western side, is covered with human bones, which the winds, or the hands of the curious, have torn from their narrow cells. The quantity of these human remains is so great as plainly to show that this spot must have been the cemetery of a dense population, or of a large district; and the mode of interment indicates a very remote period of British history, for the bones are here found placed with much care in what is called in the ancient Cornish language, kist-vaen, or a chest of stone. These kist-vaens are composed of several pieces of slate-stone, placed on their edges, so as to form a kist or cell, and differ from the Cromlêh in having no horizontal or covering stone. The kist-vaens are believed to be the most ancient British sepulchres in England, and have been found in various parts of the country. They are sometimes covered over with stones, when they are called *cairns*, instances of which we have at Lanyon and Molfra, in the parish of Maderne in Cornwall, and in Berkshire, near the track of the ancient ridgeway, in the vicinity of the White Horse Hill; and sometimes, instead of stones, they are covered by a heap or mound of earth, when they are called *barrows*; a singular instance of which is to be seen in what is called the Long Barrow, at Stony Littleton, in Somersetshire.

In the case of Perranzabuloe the kist-vaens are immersed in the sand, which has had the effect of preserving their contents in a singularly perfect manner; for the bones, and especially the teeth, are as entire as when they were first interred—probably many hundred years before the arrival of Piranus.

Close to the site of the second church stands erect a most venerable perforated granite cross. The cross is formed after the rudest mode, by three holes which perforate, and a fourth cut only a little way into the rounded head of what was commonly by the Cornish denominated "Men Skryfd," or an *inscribed stone*, for it evidently has borne an inscription, but in what character it is now impossible to decypher. It measures about thirteen feet in height, four of which are buried in the sand. This rude memorial of early Christian piety, in all likelihood, is as ancient as the time of Piranus himself, and may have originally been erected near the first church, and removed to its present situation when the second church was built, about A.D. 1100. Its form would lead us to suppose that it was once a heathen monument, British or Roman, afterwards converted to a Christian purpose.

It has already been mentioned that under the altar were discovered three skeletons, having their feet turned towards the East; but what is very remarkable, the skulls of all three were found deposited between the legs of the female.

In describing the sterility of the surrounding sand-hills, the author has represented them as *totally* des-

* See *Saturday Magazine*, Vol. XV., p. 11.

titute of verdure; he begs to qualify, in some respects, this statement, as they are here and there covered with a very stunted and coarse herbage, which affords a scanty food for the rabbits, which have burrowed in great numbers among the sand-hills. The general barrenness, however, of the whole district is very striking, as will appear from the following list of the only plants which the writer could discover on the Towans, or sand-hills.

Geranium Maritimum (*Sea Cranesbill*), in abundance.

Hyoscyamus Niger (*Common Henbane*), a solitary plant.

Cynoglossum Officinale (*Great Houndstongue*), in abundance.

Euphorbia Paralios (*Sea Spurge*), a single plant.

Calamagrostis Arenaria (*Sea Matweed*).

This last-mentioned plant is the most abundant of all, and proves of essential service in checking the roving disposition of the sand. It possesses the singular property of accommodating its growth to the depth of sand in which it grows, by which means its tough and tortuous roots and stems serve the useful purpose of binding the sand-hills together. The Dutch have long profited by their knowledge of this property, and therefore encourage the growth of it with great success on their sea-walls and the banks of their canals. According to Woodward, it is applied to the same purpose on the flat coast of Norfolk, where, as soon as it takes root, a sand-hill gathers around it.

The inhabitants of Newborough in Anglesea, maintain themselves chiefly by manufacturing it into mats and ropes, to which use it is also applied by the people of Perranzabuloe, who would do well were they more generally to attend to its cultivation, as the most effectual barrier yet known against the further "spoiling and marring of their lands" by the drifting sand.

So highly was the Calamagrostis prized on this very account, as long ago as the reign of Queen Elizabeth, that Her Majesty, under very severe penalties, prohibited its extirpation; and by the stat. 15 Geo. II., c. 33, the like prohibition was extended to the cutting of it on the sand-hills, on the north-western coasts of England.

[The Rev. C. TRELAWNY COLLINS' *Perransabuloe.*]

THE man who ventures to say, "My moral education is completed, and my works have corroborated it," assuredly deceives himself. It is always incumbent upon us to learn how to regulate our conduct for each day, and those days which are to come: we are under obligation to preserve our virtue invariably on the alert, urging us to new actions; and we are equally bound to recollect our faults, and to repent of them.—SILVIO PELLICO.

THOSE who know the value of human life, know the importance of a year, a day, and even an hour; and these when spent amid the full enjoyment of the vital functions, of how much importance to our whole existence! It is therefore an eternal and irreparable loss, when time is not enjoyed as it ought.—STRUVE.

AVOID those who, under the pretext of explaining nature, attempt to spread desolating doctrines in the hearts of men. Overthrowing, destroying, trampling upon everything which men ought to respect, they deprive the afflicted of their consolation in misfortune; they remove from the rich and powerful the only restraint upon their passions; they eradicate from the recesses of the heart, the remorse of crime, the hope of virtue, and then boast that they are the benefactors of the human race. Truth, they presume to say, is never injurious to mankind. In this, too, I agree; and it is, in my opinion, a proof that that which they preach is not truth.—J. J. R.

ELECTRICITY.

XII.

ELECTROMETERS.

THE instrument we are now going to describe may with greater propriety be termed an electrometer, than any we have before mentioned; inasmuch that it does actually *measure* the electricity which passes through, or rather over, it. This apparatus is the invention of Mr. Snow Harris, to whom we are indebted for some valuable contributions to electrical science; as we are also for an improvement in the plate machine, and in the construction of several articles employed in electrical experiments, and which are as beautiful as they are useful and ingenious.

The accompanying figure represents the electrometer, or, as it is commonly called, the *unit-jar*, of Mr. Harris. It consists of a small inverted Leyden jar, supported on an insulating stand, A *f*; the exterior coating being connected with the machine by the wire *g b*, whilst the interior coating communicates with another jar (or battery) by means of the cross-wire *a d*. The discharge of the jar is effected by the balls *c d*; the striking-distance between them, and which can be adjusted by the sliding-ring *e*, determining what quantity of electricity the jar contains.

The principle of this elegant piece of apparatus will be understood by a reference to what we have before stated respecting the accumulation of electricity on coated glass; a well-known law of which is, that whatever quantity be added to one side of a jar, for instance, a corresponding quantity will make its escape from the opposite side. Now let us suppose that we are going to charge a Leyden jar; but, instead of proceeding in the usual way, we insulate it, placing in metallic contact with its outside coating, the knob of a much smaller jar (not insulated), to which one of *Lane's** discharging electrometers is attached. The interior coating of the insulated jar being made to communicate with the conductor, we begin to work the machine; when it will be found that in proportion as electricity accumulates on the inside of the jar, so does a similar quantity leave its outside; first entering the small jar, and then, by means of the discharger, spontaneously escaping in successive sparks to the earth. By careful observation, it is possible, in this way, to obtain a tolerably correct estimate of the actual quantity of electricity communicated to a jar of any size; but it is a tedious process, and not at all applicable to general purposes.

Let us now reverse the arrangement we have been describing; substituting the unit-jar for the small jar with the discharging electrometer, and then the use of the former will at once be apparent; for, instead of estimating the quantity of electricity which enters a jar by measuring that which is displaced, we measure that which enters—the unit-jar delivering it in successive portions, as it is generated by the machine.

For instance:—The exterior coating of the unit-jar being connected with the machine by the wire *g b*, and its interior coating with the inside of the jar (or battery) to which the charge is to be communicated; on working the machine, the electricity proceeding from it will accumulate on the outside of the jar, a similar quantity at the same time making its escape

* See *Saturday Magazine*, Vol. XIV., p. 236.

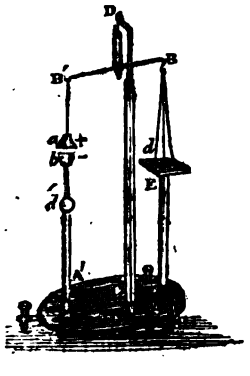
from the inside along the wire *a*. When the unit-jar has received as much electricity as it is intended it shall contain (and which is regulated by the distance between *c* and *d*), a spontaneous discharge takes place, the equilibrium of the unit-jar is thereby restored, and the electricity it contained passes to the interior of the larger jar with which it is connected. By continuing to operate in this way, and noting the number of explosions, we may charge a jar or battery with equal quantities of electricity as often as may be required; and by varying the conditions according to the nature of the experiments, we may always work with certainty as to the results—economizing both time and labour, and dispensing with every other form of electrometer.

We need hardly mention that, in using the unit-jar, it matters not whether its inside coating be in communication with the larger jar, or with the machine; the effect being the same in either case, provided all the other arrangements are complete.

The foregoing is not of necessity a costly article of apparatus, nor is it difficult to make.

The form of another of Mr. Harris's instruments is shown in the annexed figure. It is called the *Electrical Balance*; being in its principle very similar to the balance electrometer* already described; but is far more delicate in its indications, and admits of greater accuracy of adjustment, than that of *Cuthbertson*.

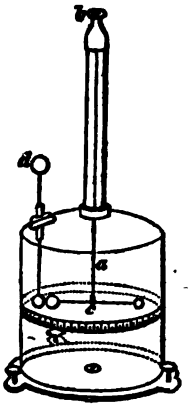
A glass pillar, or rather a strong tube, is fixed to a stand, A′ A, on the top of which, at the projecting arm D, is suspended the beam of a very delicate balance, B′ B. To one of the arms of the balance is attached, by silken threads, a brass scale-pan, *d*, which is supported by an insulating pillar, E. From the other arm of the balance is suspended, by a piece of fine wire, or metallic thread, a hollow cone, *a*, made of wood, and covered with gold-leaf; and immediately underneath it, supported by the insulating pillar, F, is a similar cone, *b*. The space between these cones is regulated by a sliding-rod, which works up and down in the ball *d*′. A further adjustment, so as to produce an exact equipoise of the beam, may be made by a micrometer screw at D. The stand of the apparatus is fixed in a horizontal position by levelling screws, as shown in the figure.



Now let us see how the instrument is used. And here the first thing to be done is to connect the beam with the interior coating of a jar, which is effected by a wire passing through the tube on which the beam is supported; the exterior coating being connected in a similar manner by a wire communicating with the cone *b*. These arrangements made, if we attempt to charge the jar whilst the cones *a b* are in actual contact, it is manifest that no accumulation of electricity will take place; the apparatus in that state forming an unbroken circuit between the opposite coatings. Let the cone *b* now be depressed, so as to separate it from the other, say half an inch, and, on turning the machine, the attractive force of the opposite electricities, acting upon each cone (as indicated by the marks + positive, − negative), almost instantly causes them to unite, when the jar will of course be discharged. If matters remain in the state just described, it will be still found impossible to charge the jar, excepting very feebly; but if some weights, say ten or fifteen grains, be placed in the scale-pan *d*, a considerable charge may be accumulated.

Proceeding in the way we have thus denoted, but varying the distances between the cones, increasing or diminishing the weights at the other end of the beam, and measuring, by the aid of the unit-jar, the quantities of electricity that in all these circumstances he employed, Mr. Harris was enabled satisfactorily to determine the laws of electrical attractions and repulsions when acting upon bodies not in contact with each other. The electrical balance, in conjunction with the unit-jar—the one *measuring* the quantity of electricity—the other *weighing* the force with which it operates, may therefore be considered important additions to the stock of apparatus; greatly enlarging the boundaries of knowledge, whilst the knowledge we acquire by them is communicated in the most intelligible form.

There is one more instrument belonging to this department of our subject that we must describe, namely, *Coulomb's Torsion-electrometer*, which is extremely sensitive, and chiefly used for detecting and determining the relative intensities of very feeble currents of electricity.



a b is a single thread of unspun silk, or what is perhaps still better, a fibre of spun glass, to which is attached a needle of shell-lac *c* carrying at one extremity a gilt pith ball, and at the other a counter-poise of some non-conducting substance, which serves as a pointer or index. *d* is a wire with a metallic ball at each end. With the exception of about half this wire and, of course, one of the balls, the apparatus must be enclosed in a glass vessel to protect it from dust, currents of air, and moisture. Around the outside of the vessel, and just opposite to the index, must be engraved a scale of equal parts. By means of the milled screw at *b* the needle *c* can be moved so that the gilt ball shall be in contact with that suspended from *d*, and when the needle occupies this position the index points to 0° on the scale.

A body in a state of electrical excitation being placed in contact with the conducting wire *d*, the pith-ball is instantly affected; being repelled by the ball at the other end of the wire, and the space through which it moves is proportioned to the intensity of the electrical disturbance, as measured by the power of torsion in the thread *a*.

On removing the electrified body, if we touch *d* with the finger, the electrical equilibrium is restored, and the instrument is in a proper state to be again excited.

We must remark generally, in reference to each of the electrometers described in this paper, as well as of every other, that they require to be carefully handled, to be kept perfectly clean and dry, and to be used only when the atmosphere is in a state favourable to electrical experiments. Under other circumstances their indications will be fallacious and therefore of no practical utility.

The forms of electrical apparatus are so various, and the uses so numerous, that we hardly know how to make a judicious selection. As, however, in these papers we attempt only what may be termed a popular, rather than a scientific, account of some of the facts connected with electrical phenomena, we think it unnecessary to extend our list of this class of instru-

* See *Saturday Magazine*, Vol. XIV., p. 230.

ments any further. In the next paper we will endeavour to relieve, what we fear has to some appeared rather tedious details, by describing a few of the long-promised experiments.

THE PEST OF THE VILLAGE.

A TALE FOUNDED ON FACTS, SHOWING THE EVILS OF INTEMPERANCE.

'Ye knew your duty, but ye did it not."
These are the words to which the harps of grief
Are strung.

UNDER this title, the General Literature and Education Committee of the Society for Promoting Christian Knowledge, have lately published a little book, containing a sad, but, we think, useful history,—"an ower true tale," calculated to find its way to many a heart, which an essay or a sermon would, probably, fail to reach. Addison says, "It was usual, among the Greeks, to make their slaves drink to excess, and then expose them to their children, who, by that means, conceived an early aversion to a vice which makes men appear so monstrous and irrational." The author of *The Pest of the Village*, has, in a less exceptionable way,—in the language of simplicity and truth,—portrayed the dreadful effects of drunkenness in the case of a man, who, through intemperance, became in effect, the destroyer of his wife, and, (as far as we can judge from the sequel of the story,) his own destroyer too, in a very awful sense.

We say deliberately, that the instance before us, actually taken from the ranks of real life, appears to us to be a specimen of a very large class of wretched beings who are, in this manner, bringing down ruin on themselves and their relations. Those persons who visit the dwellings of the poor, especially in large towns and cities, and who know anything of the domestic state of hundreds raised just above the condition of the extremely destitute, can tell of aching hearts, that were not wont to ache, and that ache now, not from bodily suffering, nor from the ordinary pains and uneasiness of life, but from the effects of DRUNKENNESS in a husband, or a son, or brother, or some near relative. This is the poisoned arrow to which many "a wounded spirit," owes its bitterness, and which first interrupted its joy.

The vice of Hubert Hilldown (the Pest of the Village), grew the more easily upon him, from the absence of that preventing and counteracting principle, which arises from religion, and religion alone. His progress in sin was therefore rapid and fatal. After some earnest but affectionate expostulations addressed to him by his poor wife, we are told,—

Affairs had now begun to arrive at a dreadful pass with Hilldown. It is no wonder, when he had ceased to regard the being and the word of God, that he lost all regard for his character and all self-control. More than once he went home in a state of intoxication, his whole family being present, and compelled to witness this disgrace. If he returned to them in rather a better state and temper, he would sit brooding alone, and often notice that George (for that was the name of the eldest child) was staring at him with astonishment. Well, indeed, might that good boy feel surprise, when he compared what he learnt at Church and school, with the scenes which met him under the parental roof. And it is true, that he did frequently gaze in his father's face with an expression of tenderness and wonder, which even a stranger could not easily have mistaken, but which sometimes went like a dagger to the parent's heart."

Thus it is that domestic happiness is broken up by one unworthy member! and thus is the young mind placed in jeopardy by the conduct of those to whom childhood and youth might justly look up for counsel, protection, and example! So infatuated was this wretched man with the love of drink, that besides having frequently indulged his shocking habit by the help of his wife's earnings, he at last stole from her a sum of money which she had saved for the purpose of meeting the expenses of lying-in.

Margaret had determined to keep this store of silver, which she had painfully earned, out of her husband's sight; because his propensity to drink too often overcame all other considerations. With the view, therefore, of doling it out carefully according as it might be wanted, she placed it in a little leather purse, under her pillow,—a pillow which she began to press night and day; her illness having assumed an alarming appearance.

Hilldown was scarcely master of himself, when, coming in one evening, after tippling with idle companions, he found poor Margaret restless and uncomfortable at his absence, and almost delirious with fever. While her youngest child lay on the bed by her side, the others were playing on the floor; and the eldest boy, who was very fond of his book, stood by his mother, reading out. Even this affecting scene moved not the drunkard. Standing unsteadily in the middle of the room, he fixed his blood-shot eyes on those of his wife, which seemed to give him a glance of reproof, and then shortly closed in sleep; if sleep it can be called, which consisted of disturbed and broken slumbers. A few seconds only were passing, while she fancied, in a state between sleeping and waking, that some one was looking sternly at her, and in the act of carrying away all the provision that she had laid up for her hungry children. She raised herself with a sudden start, and reached under the pillow for her purse,—but it was gone! Her husband had taken it, and was quitting the room.

He did not return all that night, but lay out of doors in the village, with his head resting against a gate. It appeared on inquiry, that the people at the beer shop had for some evenings refused to trust him for more liquor until he should pay his score; that in the mean time he had got it at the expense of others, and that at last the whole of poor Margaret's hardly-earned money had gone to wipe off the chalk against him, to place him in a condition lower than that of the brutes, and to deprive him of his reason for a time.

He had, indeed, when he awoke, in the morning, some wandering ideas of having committed a wicked action, and he knew that he was thoroughly miserable.

* * * * * * *

When Hilldown staggered home in the forenoon of that day, the scene in his cottage was changed. It was evidently about to become the house of mourning and death. The poor sufferer had not passed safely through her 'great pain and peril of child-birth.' Her sudden and grievous disappointment at being left literally without a sixpence to help herself, or her dear children; the confusion occasioned by a tedious and fruitless search for the lost treasure, (for she could hardly bring herself to believe that her husband could have carried it off;) the abrupt and strange departure of Hilldown, without saying a word—all these together, in her delicate condition, had tended to make her much worse, and to bring on a premature confinement.

The "pains and perils of child-birth" terminated in her death. On bringing her infant into the world, she felt that she herself was about to be summoned hence. Her patience and resignation, founded upon a faith in her Redeemer, and manifested in her manner of receiving the solemn ordinances of religion, administered by the clerygman of the parish, who attended at her last hour, form a striking contrast with the conduct of the heartless, irreligious husband.

It is not necessary to dwell on these painful features. Let it then be sufficient simply to say, that when Margaret's faithful and humble spirit was on the point of quitting its tabernacle of clay, her hand sought in vain for the friendly pressure of his, who had solemnly promised, ten years before, 'to love and to cherish' her, till 'death should part' the sacred bond.

He now looked upon her still and faded form with shame and horror. Margaret had ceased to breathe. She was far beyond the reach of his unkindness.

The stages of his wickedness and his troubles, after this event, are natural enough, but very terrible.

Conscience now began to do its work of accusation upon

this wicked man. And when conscience stands in the path, it would be well to consider it like the angel that opposed Balaam's progress, sent to warn him from his evil way. Instead, however, of receiving its visitation as a message from an offended but merciful God, Hilldown resisted the charge of conscience, and got further entangled in the snare of Satan, who made him forget his shameful conduct as well as he could, and represented his offence of drunkenness, as perhaps pardonable, and certainly pleasant. The deadly hook was baited, the fatal pill was gilded; and though he felt that his home was being broken up, and that he was every day losing ground in health, character, and comfort, he suffered himself to become yet more and more the wretched slave of drunkenness.

As if no opening for amendment should be wanting, and no apology be left him for his sin, Hilldown is made to feel the pinchings of hunger, and to become conscious of the deplorable state into which his little ones have been brought through his fault. His landlord, also, threatens him with removal from the cottage which is "kept like a pig-sty,"—he will have "such a tenant no longer." But this is all in vain with the now confirmed and desperate sot. The strong, but kind and scriptural admonition which he receives from the Pastor of the flock, is equally fruitless: and the time comes for him and three of his children, to be taken to the poor-house:—

Strange as it may appear, he managed to get some liquor on the very morning of his removal, and had become quite frantic, so that it required two men to help him out of the cottage. The children, not knowing what it meant, when they saw their father placed in a cart, cried bitterly as they passed through the village, which made some of the neighbours run to their doors. 'Ah,' said they, 'any one might tell it would come to this. Why, how dreadfully fierce Hubert Hilldown looks! He grinds his teeth and rolls his eyes as if he would murder the constable, if he could.'

Our pages shall not be stained with all the horrid language uttered by the drunkard on this occasion. He impiously invoked the divine vengeance, cursed himself, and defied the name and the power of God.

Though he had often declared, with an oath, that he would have nothing to do with the poor-house, he entered it as one of the inmates; but he entered it a poor, altered, creature,—pale, dejected, miserable, and almost sightless. Immediately after getting out of the cart, Hilldown fell to the ground in a fit of paralysis, which is not unfrequently the effect of drunkenness,—and became nearly blind. He was silent in an instant; his convulsed features lost, at once, all their savage expression; his intellect was evidently weakened; and he was led without further resistance into his appointed dwelling.

We are grieved to say, that there is as yet no bright side in the history of Hubert Hilldown. When the Clergyman, who called at the house, saw him last, the unhappy man raised himself up in his bed, and directed his face towards him, but neither knew his voice, nor understood a word of what that gentleman said, when he spoke to him about his prospects in a future life, and offered up prayers in his behalf.

Several passages selected from the Old and New Testament, condemnatory of the sin of drunkenness, are inserted at the end of this little book. We heartily wish it all the success which the writer, in the composition of it, evidently hoped for; and we trust that he will not be disappointed in finding "that it has tended to promote the comfort and improvement of some unhappy family, by acting as a check to intemperance, and practically inculcating that fear of the Lord, which is the 'beginning of wisdom.'"

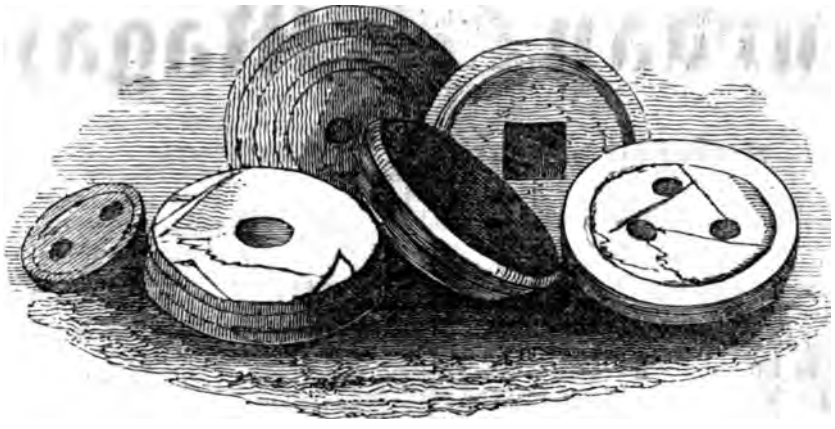
Let not the freedom of inquiry be shackled. If it multiplies contentions amongst the wise and virtuous, it exercises the charity of those who contend. If it shakes for a time the belief that is rested only upon prejudice, it finally settles it on the broader and more solid basis of conviction.—White.

It is with our judgments as our watches: none go just alike, yet each believes his own.—Pope.

KIMMERIDGE COAL-MONEY.

These mysterious relics, whose origin and use have completely baffled our antiquaries, are found, together with numerous other relics of great, but unknown age, in many parts of the isle of Purbeck in Dorsetshire, but more especially in the bay of Kimmeridge, to which they owe their name. They are there found in great plenty buried a few feet below the ground, generally at the tops of high and perpendicular cliffs of the bituminous shale, called Kimmeridge coal, or slate; a soft, laminated substance, of a sombre brown or black colour, very inflammable like coal, but of a texture more resembling slate, as it is easily split into layers in one direction only. This rock is the substance of which the Coal-Money, as it is called, is made, and in or near which it is generally found. Some specimens of it have been also discovered in another district of the isle of Purbeck, viz., the great bed of pipeclay, which furnishes a considerable portion of that material to the potteries. The specimens of ancient art and natural objects found, together with coal-money, in the barrows and rude earth-works of that neighbourhood, are vases and broken pieces of pottery, human bones, but more frequently those of beasts, and sometimes birds, ashes of the Kimmeridge coal, and a few other miscellaneous articles, which prove the country to have been inhabited or colonized by some tolerably civilized nation, at a very remote period of history. The pottery, which forms the largest portion of these relics, is chiefly in the form of urns, vases, and pateras, ornamented with the ancient zig-zag and other mouldings. It is of two kinds, a thin black earthenware, of very rude construction, and a highly finished and glazed red pottery, richly and tastefully ornamented, and whose workmanship is in no point surpassed by the finest pottery of the present day. These urns often contain coal-money. The animal-bones, which are so plentiful, appear to have been the remains of sacrifices, for stone altars and pateras beautifully carved have been found, with red ashes of Kimmeridge coal; and an earthenware patera was once found containing a young bullock's head, surrounded with coal-money, and enclosed in a subterraneous chamber, whose sides and roof were formed of flat blocks, or slates, of the Kimmeridge rock. Collections of the coal-money and of bones, &c., are often found in similar rude chambers formed of flat stones, set edgeways on either side, and covered by similar stone slabs placed across them horizontally. The clay, of which the interesting pieces of pottery are made, appears to have been brought from the pipeclay district, a few miles off, and to have been baked by Kimmeridge coal, as there are many accumulations of its red ashes, indicating the sites of fires or furnaces, and pieces of unbaked clay have been found, with the impressions of fingers, as if they had been squeezed while wet in the hand. The depth at which these remains are generally found is from one to three feet, buried in the vegetable soil, which is very black and rich. Near the edge of a cliff in Kimmeridge bay, however, there is a large mound which, when opened, presented a vast and confused mass of these mixed relics, and on opening a shaft on the spot, the depth of between twenty and thirty feet was attained without arriving at the natural soil, or penetrating beyond this vast collection of bones, ashes, and broken pottery, which was intersected by stone walls of great thickness.

The remarkable and mysterious remains which form the most singular part of these relics, are pieces of the bituminous shale, of a perfectly circular shape, having their edge surrounded with plain mouldings, and evidently turned in a lathe; their diameter is



KIMMERIDGE COAL-MONEY.

from one to three inches, and their thickness from a quarter to half an inch. The mouldings on their edge generally give them a conical contour, one side being larger than the other. Exactly in the centre of the smaller side is the centre hole by which they were fixed to the lathe, and the other and larger side presents very various appearances, the most common of which are represented in the cut at the head of this article. The most common kind has two large holes, diametrically opposite each other, and near the circumference of the piece. Some specimens, however, especially the smaller ones, have three, four, or even five holes arranged quite symmetrically at equal distances round near the edge. Regular geometrical figures have also been found, scratched or cut on the pieces of coal-money, such as circles, which were evidently drawn with a pair of compasses, as an indentation was visible in the centre where one leg of the compasses stood. Pieces have been found having one side convex, and almost covered with concentric circular mouldings, leaving a flat circular space in the centre. In the cut representing a few of these bodies, one is seen having inscribed on it an equilateral triangle with a hole at each corner. There is also one with a large square hole which is very common, and these square holes are sometimes cut entirely through the thickness of the piece, which is never the case with the round holes. An irregular piece of the bituminous shale was once found in the neighbourhood, having a smooth surface, on which were drawn, with mathematical nicety, several lines and angles, two small circles evidently drawn with compasses, and a portion of a very large circle, apparently divided into degrees or small parts, so as to resemble a curved graduated scale. The perfect state of preservation of the coal-money is very surprising when the great tenderness of the material is considered. It has been supposed that they were rendered so durable by some animal substance, for they have rather a greasy appearance and feel, and when soaked for a long time in water, become covered with a white greasy substance. Although they are formed of so fragile and friable a material, the lapse of many centuries has not worn away the sharpness of their edges, nor defaced their simple ornaments. They seem peculiar to the isle of Purbeck, for no bodies at all resembling them in form and material have been found elsewhere; and it is very remarkable that no account exists of this bituminous stone having been found cut or turned into *any other shape*, if we except the piece described above, a small bowl of it containing coal-money, and some fragments of rings beautifully turned and polished, which have been found with the money.

Among the various mixed remains accompanying the coal-money, very sharp-edged fragments of flints have been found, and it has been conjectured from their appearances, that they were used in turning the bituminous slate into the round pieces called coal-money, especially as it has been found by repeated experiments that flints are the most convenient tools for turning this substance, as its velocity in the lathe blunts steel tools in a very short time. The holes certainly appear to have received some projecting part of the lathe, to hold them fast while turning.

In the bay of Worthbarrow, where coal-money, vases, &c., are frequently found, there lies an immense stone seven feet in diameter, and two feet thick, which may be described as an enormous piece of coal-money, for it is perfectly circular; has its edge worked into mouldings, and, in fact, it exactly resembles some pieces of coal-money in shape.

The appearances of these singular remains are so puzzling, that very few conjectures have been offered concerning their use, or to what nation or period of antiquity their formation is to be ascribed. They cannot be British works because they are so extremely local, besides, the different remains clearly indicate a mutual intercourse between a very rude and a highly civilized people. The two or three bays in which they are found must therefore have been the site of some ancient settlement or colony; not Roman, because the place is so very unfit for a military station, and so exposed on every side to inroads, that it would never have been chosen by the Romans or any very warlike people. Now the Phœnicians are known on the authority of Strabo to have visited Britain, especially Cornwall, and to have bartered pottery and other articles, for tin, hides, &c. It has therefore been conjectured that, having discovered both clay and coal in the isle of Purbeek, they, instead of bringing pottery from their own country, established a settlement in Purbeck for the manufacture of pottery, which might afterwards be bartered with the rude natives. Still, however, the use of the *coal-money* remains a mystery. They might, perhaps, have been medals, amulets, or charms, but they cannot have been intended for coin, or they would not be so local, nor formed of so tender and fragile, or so plentiful a material.

The writer of this article has inspected the localities of the Kimmeridge Coal-Money, and the drawing above is made, for the most part, from specimens in his possession.

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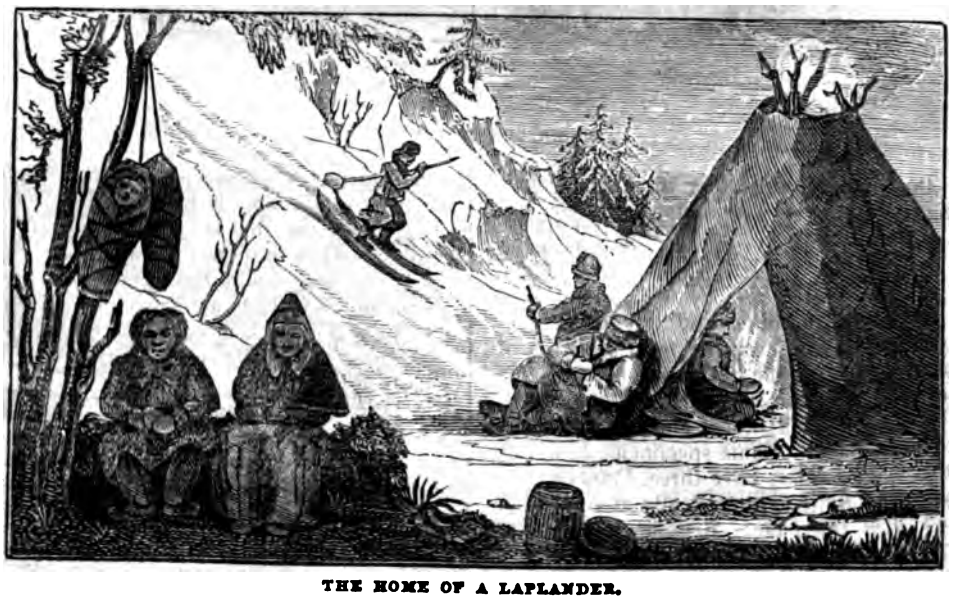
HOUSES OF ALL NATIONS. No. I.



THE HOME OF A LAPLANDER.

ON PRIMITIVE HABITATIONS.

s of all nations! How readily does this expression in the mind a number of associations connected *me*,—with the feelings, the affections, the comforts, usements, the employments which peculiarly mark e-side, and separate it from the busy world without, clashing interests and impulses! We speak of an fire-side with peculiar affection, both because we miliar with it, and because it has avowedly more s than the fire-sides of most of the other nations. must not let our love of country induce a forget- of other lands. We propose, therefore, to conduct ders in a ramble over the face of our beautiful and have a peep at the dwellings of our fellow- es.

e are three ways in which the "houses of all nations" systematically arranged,—1st, chronologically; be- g from the early ages, and terminating in our own nd, geographically, beginning at some particular part earth, and proceeding regularly from country to coun- d, according to their skill and convenience, beginning ie rudest dwellings, and proceeding onwards to the laborate. The last is the most convenient form in the subject can be treated, because neither chronolo- nor geographically are dwellings arranged in the f their excellence and comfort. We shall therefore with primitive dwellings, and proceed onward to the ivilized; and we shall confine ourselves principally to ellings of the present day, as most of the habitations one days have prototypes in some part of the world present time. *Rude* habitations will occupy the t number.

it then is the most simple and primitive dwelling for Is it not a *cave*, hollowed by the hand of Nature, in or mountain? No roof, no floor, no rafters, no walls, rcase, have to be built. Nature has formed them, such are, and men have often been glad to avail themselves habitations. Our friend Robinson Crusoe was not the an, either real or fictitious, who has been glad to dwell ave. There was a nation in ancient Africa, called *dytes*, a name formed from two Greek words, signi- "dwellers in caves" As far as the inquiries of learned men have extended, it appears that Cush, the son of Ham, and the grandson of Noah, first peopled the eastern parts of Africa, now known as Egypt, Ethiopia, Abyssinia, &c. The Abyssinians, as Bruce tells us, have a tradition, that almost immediately after the flood, Cush, with his family, passing through Atbara, from the low country of Egypt, then unoccupied, came to the ridge of mountains, which still separate the flat country of Atbara, from the more mountainous highland of Abyssinia. This tradition says, that terrified with the apprehension of another deluge, (that awful event being recent in their minds,) they chose for their habitation caves in the sides of these high mountains, where they might be secure, and where the adjacent country was fertile and pleasant. When natural caves became too few in number, they formed for themselves commodious habitations in mountains of granite and marble, several of which remain entire to this day. As the Cushites became numerous, these habitations increased, and many of their descendants still occupy the same mountains and houses of stone. Whatever may be the correctness of this tradition, it is certain that Egypt and the neighbouring countries present numerous caves, both natural and artificial, which have served, and still serve, the purpose of dwellings.

Let us cross the Atlantic, and we then find, in the State of Kentucky, caves of the immense extent of three miles in length, and presenting awfully grand phenomena to the eye of the spectator. These caves are not now inhabited; but there are evidences that they were formerly inhabited by a tribe of Red Indians, when the latter possessed the country which the whites now occupy. Human bones, reed-torches, mocassins, or Indian shoes, cloaks of matting, &c., are strewed about the caves, and afford proof of what was once the purpose to which they were applied.

The next step is to avail oneself of a shelter, formed either from or in a tree. Some nations select hollow trees, with an opening either at the bottom or at some distance from the ground, to which they ascend by notches cut in the bark of the tree, or in a portable piece of wood, which serves as a rude ladder. This is represented in the following engraving, which gives a view of one of the habitatory resources of those rude tribes inhabiting the islands of the southern hemisphere.

OCEANIC NEGROES' HOLLOW TREE, AND NOTCHED LADDER.

Many tribes, occupying a very low state in civilization have scarcely any home, but that which they carry about with them from place to place, viz. a thatched roof attached to their head, forming the double purpose of roof and umbrella, such as in the annexed engraving.

THATCHED INDIAN.

But let us now proceed to habitations, which, although rude in the extreme, are yet dwellings, within which the hours of sleep are passed, and victuals are cooked. It may perhaps be an agreeable mode of conducting our inquiry, to take an imaginary ramble from continent to continent, and view the ruder sort of dwellings in our progress. Let us begin with

America.

At the northern part of this immense continent we find Esquimaux, whose habits sufficiently resemble those of northern Asiatics, to allow us to defer mention of them for the present.

INDIAN HUT

But when we come southward of these, we arrive at the North American Indians, and the Canadians, and by degrees mingle with men of our own race in the United States. Such opposite races must obviously have habitations of different classes in point of comfort. The Indian has his hut built in the depth of a forest, or in a widely-spreading plain, and it is as rude and simple as are his habits.

The humble habitations in the United States, which are not log-houses, approach sufficiently to a similar rank of houses in England, to allow us to pass them over, and proceed to the next important country, *Mexico*. When the Spaniards discovered Mexico, it was not uncommon to see the rude hammocks or beds of the natives slung from tree

MEXICAN HAMMOCKS.

to tree in the open air. But we will proceed to speak of their houses.

Mexico presents all that variety of houses which we may suppose to exist in a country inhabited by mixed races, some Indians and some Europeans, or at least whites descended from European stocks. Captain Lyon thus describes the small town of Panuco:—"The town is situated on the southern bank of the river, and was at this time of the year at an elevation of thirty feet above it; but in a more advanced period of the rainy season, which had now commenced, the waters frequently inundate the streets, and it has more than once happened that canoes have plied there. Many of the houses are comparatively good, but by far the greater proportion are of split bamboo, plastered with mud, and thatched with the fan-palm, which is also the covering of the best buildings."

Further in the interior he took shelter in an Indian hut, and passed the night in a manner which would not be deemed particularly comfortable in England. "The saddles of a number of mules were all mounted across two long beams, with the large wooden stirrups hanging a sufficient depth below them to knock our heads whenever we moved. Four hens with broods of chickens, and three others which were sitting on their eggs, occupied various snug corners. Some half-dried beef, in long odoriferous festoons, dangled on one side; while on another were suspended, to dry, three raw deer-skins, and the hide of a puma or American lion. The place swarmed with mosquitoes, and I went supperless to bed under my gauze curtains. My two men, who had no such luxury, were soon driven out to the open air, where they covered themselves in their blankets, and lay in company with our landlord, (who was the Indian Alcaide,) his wife, children, dogs, and pigs, on the dusty ground. Soon after my candle was put out, an Indian and his wife came to sleep in my room, which I now discovered was a kind of general head-quarters for travellers, and all the dogs of the establishment entering also, carried off several good things which I had hoped to have cooked for the morrow's breakfast."

Huts formed of stakes and bamboos, and thatched with palm-leaves, were the original residences of the Mexican Indians.

One consequence of the materials of which a house is formed being slight and rude, is, that in case of depredation or other injury, it can be removed or re-built with great facility. Humboldt, when travelling through Mexico and Guatemala, came to a mission, that is, a small settlement of Indians with a Spanish missionary at their head. This was before Spain had lost her territorial possessions in America. Humboldt says "Towards evening we reached the mission

inaguana, the soil of which is almost on a level with llage of San Antonio. We were much in need of our clothes. The missionary received us cordie was an old man who seemed to govern his Indians reat intelligence. The village has existed only thirty on the spot it now occupies. Before that time it aced more to the south, and backed by a hill. It nishing with what facility the Indians are made ove their dwellings. There are villages in South ca which in less than half a century have thrice d their situations. The native finds himself at- by ties so feeble to the soil he inhabits, that he s with indifference the order for taking down his to rebuild it elsewhere. A village changes its situa- e a camp. Wherever clay, reeds, and the leaves of m or heliconia are found, a house is built in a few These compulsory changes have often no other than the caprice of a missionary, who, recently from Spain, fancies that the situation of the mission ish, or, that it is not sufficiently exposed to the winds. villages have been transported several leagues."

nother part of the country, Humboldt entered an hut. Four natives were seated round a fire, eating a paste consisting of large ants, of which several bags spended over the fire. There were more than four- rsons in this small cabin, lying naked in hammocks above each other. They received the travellers and two young women prepared cassava-cakes; after the travellers retired to rest. The family slept only in the morning, when they began to converse in ammocks. This custom of being awake four or five efore sunrise Humboldt found to be very general.

proceeding southward, the states of Brazil, Chili, &c., present great variety of dwellings, from that Indian in its rudest form, to that of the merchant or ndee. The Indian, who roams over the Pampas, has e hut, differing little from those of other Indians. llages, in which slaves are employed in various occu- , are of a somewhat more respectable class, and may esented by the annexed engraving.

BRAZILIAN VILLAGE.

n again, we have the hut of the miner, built at the of the tremendous mines which are seen in Chili. orer dwellings in Chili, like those of many other es, are made of stakes stuck in the ground, and d together with transverse pieces of wood, either with twine, made from the hemp of the country, with the a water-tree not unlike the poplar, or with thongs. have only a thick wattled wall of myrtle, or broom; have the chinks in the wattling filled in with clay, hite-washed either with lime,—which the natives ow to prepare from beds of shells found in the country the invasion of the Spaniards,—or with a kind of chre, which is very fine and is found in pretty large n different parts of the country. The roofs are more constructed, having usually over the supporting a layer of branches plastered with mud, and l with palm-leaves. Broom, leaves, and a long fine are also used for roofs. However poor the house, there ys a separate hut for cooking at a little distance.

n a man wishes to build a better sort of house, in Brazil, he digs down a portion of the nearest hill, ters the loose earth till it acquires the consistence of water. A number of countrymen then tread it to a proper smoothness and consistency; after which, a quantity of chopped straw is added, which is again trodden till it is distributed through the mass, which is, of course, more solid for the bricks. These bricks are then formed in a wooden frame, and then placed in the shade to dry, after which, they are exposed to the sun to harden. After the walls (which are often very thick, and made of bricks sixteen inches long, ten wide, and four thick,) are built, they are generally allowed to stand a short time to settle, before the rafters are laid on; and indeed the roof is a formidable weight. A very thick layer of green boughs, leaves and all, is first fastened with twine upon the rafters, whose interstices are pretty closely filled up with canes; a layer of mortar, or rather mud, of at least four inches thick, is spread above that; and in that mud are bedded round tiles, whose ridge-rows are cemented with lime-mortar; a thin coat of which is spread over the coarser plaster, both without and within the houses.

The accomplished traveller, Mrs. Graham, in speaking of the more comfortable class of cottages in these countries, says,—"My house is one of the better kind of really Chilian cottages. It consists of a little entrance-hall, and a large sitting-room 16 feet square; at one end of which, a door opens into a little dark bed-room, and a door in the hall opens into another a little less. This is the body of the house, in front of which, looking to the south-west, there is a broad verandah. Adjoining, there is a servant's room, and at a little distance, the kitchen. My landlord, who deals in horses, has stables for them and his oxen, and several small cottages for his peons and his families, besides store-houses all around. There is a garden in front of the house, which slopes down towards the little river that divides me from the Almeudral, stored with apples, pears, almonds, peaches, grapes, oranges, olives and quinces, besides pumpkins, melons, cabbages, potatoes, French beans, and maize, and a few flowers; and behind the house the barest, reddest hill in the neighbourhood rises pretty abruptly. The interior of the house is clean, the walls are whitewashed, and the roof is planked, for stuccoed ceiling would not stand the earthquakes, of which we had frequent shocks. No Valparaiso native house of the middling class boasts more than one window, and that is not glazed, but generally secured by carved wooden or iron lattice-work; this is, of course, in the public sitting room; so that the bed-rooms are perfectly dark; I am considered fortunate in having doors to mine; but there is none between the hall and sitting room, so I have made bold to hang up a curtain, to the wonder of my landlady, who cannot understand my finding no amusement in watching the motions of the servants or visiters who may be in the outer room."

We must not dwell longer in America, but cross the Atlantic, and land at the Cape of Good Hope in

Africa.

Here we find Englishmen, Dutchmen, Kaffres, Bushmen, and the lowly, meek, wretched Hottentots. Many are the grades of comfort in the dwellings in these parts; but the Hottentot is not only the humblest of them, but nearly at the bottom of the scale of human beings.

The kraal of the South Africans is a little encampment of huts, the entrances to which open into a central court-yard, common to them all. Mr. Thompson, the African traveller, thus describes them. "On awaking at dawn of day, a curious scene presented itself to me. I was in the midst of a considerable kraal, situated on a ridge of land which commanded an extensive view of the windings of the Great River. The kraal, or cattle-fold, was formed partly by the cabins of the natives, arranged in the shape of a half-moon, and partly by a hedge of thorns which completed the circle. The horde consisted of about fifty souls, and were in possession of above two hundred cattle. Their huts, all fronting inwards to the kraal, are constructed of mats stretched over a frame of sticks in the shape of a bee-hive, and afford but an indifferent shelter in cold weather; but they are easily removed with them on their pack-oxen, as they migrate from place to place; and seem quite to satisfy their ideas of comfort, though excessively dirty and swarming with vermin."

These kraals vary in minor details in different parts of Southern Africa; but they are, as a general rule, bee-hive shaped, and frequently not more than three feet high. The door is a mere hole into which the inhabitant can only pass by lying almost flat down.

In some places, where lions abound, the natives erect a

curious sort of a house for the protection of their children. It consists, in fact, of a cabin, erected on the top of poles or branches, ten or twelve feet high. The little urchins learn to climb up these poles, and reach the cabin on the top, where they remain in security.

HOTTENTOT KRAAL.

When we depart from the southern regions of Africa, we hear of vast regions which have never yet been visited by civilized man. What nations inhabit them we know not, but we may presume that they are low in the scale of civilized beings. Enterprising travellers have penetrated to some distance into the interior from the sea-coasts, but have never reached the great central districts.

The travellers who have sought for the source of the Niger river have done more than most others in exploring the northern half of Africa. Among these, the names of Denham, Clapperton, Park, Lander, and Laing, stand conspicuous.

In Denham and Clapperton's journeys into the interior of Africa, from the shores of the Mediterranean, they naturally met with dwellings of various kinds and various degrees of comfort, according to the character of the people whom they encountered. The travellers describe an encampment of *Tibboos*. Their huts were not numerous, but were regularly built in a square, with a space left in the north and south faces of the quadrangle, for the use of the cattle. The huts were constructed entirely of mats, which excluded the sun, but admitted both light and air. These habitations are preferred, in fine weather, to the tents of the Arabs of the north. The interiors are very clean and neat: clean wooden bowls, with covers of basket-work, for holding milk, were hung against the wall.

Proceeding a little further on the same route, the travellers visited a town called *Lari*, situated on an eminence, and containing about two thousand inhabitants. The huts are built of the rush which grows by the sides of a neighbouring lake; they have conical tops, and look something like well-thatched stacks of corn in England. They have neat enclosures round them, made with fences of the same reed, and passages leading to them like labyrinths. The interior of the huts is neat. They are completely circular, with no admission either for air or light except at the door, which has a mat, hung up by way of safeguard. Captain Denham entered one of them, which had the best appearance; although the owner gave him no smiles of encouragement, and followed close at his heels, with his spear and dagger in his hand. In one corner stood the bed, a couch of rushes lashed together, and supported by six poles, fixed strongly in the ground. This was covered by the skins of the tiger-cat and wild bull; round the sides were hung the wooden bowls used for water and milk, and a tall shield rested against the wall. The hut had a division of matwork, one half being allotted to the female part of the family. His host, however, continued to look at him with so much suspicion, and seemed so little pleased with his visit, notwithstanding all the captain's endeavours to assure him he was a friend, that the traveller was glad to terminate his visit.

When Denham reached Konka, in Bornou, the chief of the county ordered huts to be built for him. These huts were little round mud buildings, placed within a wall. The enclosure was quadrangular, and had several divisions formed by partitions of straw mats: into these mud huts *the travellers* crawled.

As a sample of the best houses in Bornou, and perhaps Central Africa generally, we may perhaps select the following description from Major Denham. The houses consist of several court-yards between four walls, with apartments leading out of them for slaves; then a passage and an inner court leading to the habitations of the different wives, who have each a square space to themselves, enclosed by walls; it has also a thatched hut. From thence also you ascend a wide staircase of five or six steps, leading to the apartments of the owner, which consist of two buildings like towers or turrets, with a terrace of communication between them, looking into the street, with a castellated window. The walls are made of reddish clay as smooth as stucco, and the roofs most tastefully arched on the inside with branches, and thatched on the outside with a kind of grass. The horns of the gazelle and antelope serve as a substitute for nails or pegs. These are fixed in different parts of the walls, and on them hang the quivers, bows, spears, and shields of the owner.

Here is a description of the residence of one of the chief officers of the Shieck of Bornou. "His habitation consisted of two enclosures, besides one for his two horses, cow, and goats, and may be taken as a sample of the best residences in Konka. In the first of these divisions was a circular hut with a cupola top, well thatched with *gussub* straw, something resembling that of the Indian corn. The walls were of the same materials; a mud wall, of about two feet high, separated one part from the rest, and here his corn was kept; and a bench of like simple composition, at the opposite side, was his resting-place: this was covered with mats. His spears and wooden bowls for water and milk, hung on pegs, completed the furniture. In the second division there were two smaller huts, about ten paces from each other, in which dwelt his two wives."

Of the other districts of Africa, vast as they are, we know too little to make it worth while to dwell upon them,—Egypt excepted, whose wonders deserve to be treated by themselves. The houses of Barbary and Morocco partake of the magnificence that marks many Mohammedan countries,—that is, the houses of the wealthy: for the poorer habitations are but little superior to many which have hitherto engaged our attention.

We must now quit Africa, and, crossing the isthmus of Suez, enter

ASIA.

HERE we arrive at Arabia, a country inhabited by two very distinct classes, viz., the dwellers in the sandy deserts, and the dwellers in towns and cities.

That portion of the Arabian population who roam over the sandy deserts instead of dwelling in cities and towns, reside in tents, and have done so from the earliest ages. These tents are their cherished homes, and when the Arabs remove, they transport their dwelling with them. The height of this dwelling is generally about seven feet, its length from twenty-five to thirty, and its breadth about ten. It is divided into two apartments, one for the men and the other for the women; and these are separated by a white woollen carpet of Damascus manufacture, drawn across, and fastened to the three middle posts. The mode of encamping differs according to circumstances. When the tents are but few, they are pitched in a circle; if the number is considerable, they extend in a straight line, perhaps along a rivulet, in rows three or four deep. The chief's tent is always on the side where danger is apprehended, or where travellers are expected, it being his particular business to oppose the former and to honour the latter. Every chief sticks his lance into the ground in front of his tent, to which he ties his horse or camel; the pack saddles forming the couch on which he and his guests recline. When wandering in search of water or pasture, they move in parties slowly over the sandy plain. The armed horsemen ride foremost, as a reconnoitreing detachment; the flocks with their young follow; behind come their beasts of burden, loaded with the women and children, tents, baggage, and provisions. On their journey they frequently have to halt for refreshment and repose.

The houses of the Arabs who dwell in towns differ exceedingly in their appearance and comfort, according to circumstances. At Mocha, celebrated for its coffee, the houses of the lower class of the people, who rarely change their under-dress until it is worn to rags, are circular huts composed of wicker-work, covered inside with mats, and sometimes on the outside with a little clay. The roofs are uniformly thatched, and in front each has a small area or yard fenced off. The inhabitants have a singular fancy for

ARABS RESTING.

ɜ their dwellings in clusters, though there is ample thin the walls unoccupied.

and various districts in Asia Minor, sufficiently ɜ Arabia in the construction of their dwellings to der the same description. Some rude classes inhabit ɜrts in a roving kind of life, while others dwell in

ɜ now proceed eastward to Persia.

razer describes the huts or tents of the wandering Persia as being simple and easily removed, like Arabia, and many other countries. The tribes live roduce of their flocks and herds. Black bread, sour h curds, and occasionally a little meat, are their diet; and although they do not abjure wine, they ndulge in any intoxicating liquor. The number o in a body depends on the extent of pasture they mand. They encamp usually in form of a square , the abode of the chief being in the centre. But ɜn pitch, without any regard to order, by the banks rivulet, and, if weak, in a situation which admits ɜdy retreat to the hills. The traveller, reaching ninence which overlooks the valleys, may see their nts, like spiders' webs, stretched on the ground in ; and horses, camels, mules, sheep, and cattle, at large around. The young men employ them- ɜ military exercises, hunt, or sit in circles, smoking ɜning to songs and tales, or gazing at the tricks and s of buffoons, some of whom are very skilful.

ɜ the pastures are bare, they shift to some other The march of one of these parties is a striking spec- The main body is generally preceded by an advanced f stout young men, well armed, as if to clear the en follow large flocks of all kinds of domestic ani- vering the country far and wide, and driven by the the community. The asses, which are numerous, ɜh small horses, are loaded with goods, tents, clothes, d boilers, and every sort of utensil bound confusedly . On the top of some of the burdens may be seen l the elder children, who act the part of drivers: ɜs the lesser urchins, not able to speak, yet quite at ase, neither seeking nor receiving attention, but on manfully with feet and hands. A third class of bear the superannuated of the tribe, bent double e, and hardly distinguishable from the mass of rags ms the seat. The young men and women bustle reventing, with the assistance of their huge dogs, ttle from straying too far. The mothers, carrying nger infants, patiently trudge along on foot, watching gress of their domestic equipage. The men, with houghtful demeanour, armed to the teeth, and duly d for action, walk steadily on the flanks and rear of tesque column, guarding and controlling its slow ular movements.

ame distinguished traveller describes the generality town-houses in the following words. "Surveyed commanding situation, a Persian town appears par- monotonous and uninteresting. The houses, built do not differ in colour from the earth on which and, and from their lowness and irregular construc- semble casual inequalities upon their surface, rather man dwellings. Even those of the great seldom one story, and the lofty walls which shroud them ght produce a blank and cheerless effect. There public buildings, except the mosques, medressas, ges, and caravanseries; and these, usually mean like the rest, lie hid in the midst of the mouldering relics of former edifices. The general *coup d'œil* embraces an assemblage of flat roofs, little rounded cupolas, and long walls of mud, thickly interspersed with ruins. Minarets and domes of any magnitude are rare, and few possess claims to elegance or grandeur. Even the smoke, which towering from the chimneys, and hovering over the roofs of an English city, suggests the existence of life and comfort, does not here enliven the dreary scene, and the only relief to its monotony is to be sought in the gardens, adorned with chinar, cypress, and fruit-trees, which to a greater or less extent, are seen near all the towns and villages of Persia."

We will now proceed northward of the Caspian Sea, and view the dwellings of the Tartars, Calmucks, and Russians of Central Asia.

The wandering Calmucks, and other roving tribes of the interior, construct their huts with especial reference to facility of removal. The huts are generally of a circular form, covered with felt or matted wool, the frame-work being constructed of osier hurdles, tied together with horse-hair. The roof or covering of the hut is conical, with a small hole in the centre to serve as a chimney. All this is very easily taken down and removed: and the materials are so slight and simple, that one or two oxen will frequently be able to carry the materials for building a hut from one place to another. The besetting sin of most of the tribes in this part of the world is a want of cleanliness; the persons, the interior of the dwellings, and the domestic utensils being generally in an extremely dirty state.

Somewhat better are the cabins of the villages in Eastern Russia, but not much; they frequently consist of two rooms, in one of which is an open hearth for a wood fire, over which is suspended the iron pot for cooking victuals. Opposite this is usually a bench, about eighteen inches high and six feet broad, covered perhaps with mats, perhaps with the skins of wild beasts; and these serve the inmates as chairs by day and beds by night. The walls are frequently built of wood and moss, and consist of large beams laid one over another, with layers of moss between them. The contrivance for a window is simple enough: a square hole is cut in one of the walls, and this is left open in Summer, but covered with a piece of ice instead of glass in Winter. One of the huts of central Asia is here represented.

HUT OF UNCIVILIZED ASIATICS.

We must now again proceed southward, across the Himalaya mountains, into the peninsula of India, where, as may be expected, the dwellings of the poorer classes vary much with their religion and civilization, and with their intercourse with the English. The poorer inhabitants of Bengal are generally forced to put up with a damp wretched hut, consisting of but one room; while the middle classes, although their walls are built of mud, and roofed with bamboo and thatch, are enabled to give their dwellings the more commodious form of a quadrangle, encompassing an open court, a form very prevalent in the East.

In the Mysore territority, in Southern India, the huts of the peasants are of a better class; the mud of which they are built is mixed with a durable kind of earth, which resists rain more completely. The walls are even frequently smooth, and painted with alternate streaks of red and white.

The natives of Malabar are lower in the scale of comfort. Their huts are very little better than the kraal of the Hottentot, shaped like bee-hives, three or four feet high, and with an opening serving the triple purpose of door, window,

and chimney. But they are superior to the kraals in this respect, that one hut is appropriated for cooking, another for sleeping, and a third for a store-house. But there are other parts of Malabar, in which the dwellings assume a more respectable appearance; they are two stories high, built of stone, and thatched with cocoa-nut leaves: the kitchen is generally situated in a part of the house least accessible to strangers, from the peculiar prejudice of the natives, that the very look of a stranger would pollute the vessels and utensils. The position of the hearth is generally on the south-west side of the dwelling, because, in their opinion, the dwelling of the god of fire is in that direction,—a peculiar divinity, presiding over each of the eight points of the compass. It not being customary for men, unless they happen to be near relations, to visit the female part of the family,—to avoid the necessity of introducing strangers into the apartments where they are usually occupied with household affairs, verandahs, or alcoves, are usually constructed, both within and without the principal gate of the entrance, under which the men assemble and receive visitors.

Colonel Tod describes the peasants' villages in Marwar and the neighbouring parts of India, as approaching more to the American wigwam than to the other villages in India. Each commune is surrounded with a fence, or wall of thorns, which, with the stacks of chaff rising above it at intervals, has the appearance of a respectable fortification. These stacks of chaff, intended to supply the cattle with provender in scanty rainy seasons, are erected to the height of twenty or thirty feet, and are coated with a cement of earth and cow-dung, with a sprinkling of thorns, which are added to keep away the birds from roosting in them. If fresh coated occasionally, they will endure ten years. The houses are sometimes thatched with bull-rushes, which grow to the height of ten feet.

In many parts of India, the depredations of hostile tribes are so frequent, that the inhabitants of a village or small town will surround their settlement by a wall, more or less secure according to circumstances: some of the villages in Ajmeer are surrounded by hedges which rise very high and thick, and which almost entirely conceal a mud wall erected within it. Some better-built villages are surrounded by a stone wall, six feet high, and surmounted by a mud parapet, from which the inhabitants hurl stones upon an attacking enemy; and these walls and forts erected near them, are guarded night and day, such is the hostile feeling between neighbouring tribes.

Forbes describes the villages of Guzerat as being more open and tranquil. They generally consist of thatched cottages, built of mud, and a few brick houses with tiled roofs; while near them are tanks, or reservoirs, for the reception of rain-water, which are to supply the inhabitants with water during the eight months of the year when no rain falls.

In crossing the peninsula to the banks of the Ganges, we find mud-walled thatched cottages, but with an air of neatness and comfort about them. Bishop Heber thus describes an Indian farm-yard in these parts.—"In front was a small mud building, with a thatched verandah looking towards the village, and behind was a court filled with cocoa-nut huts, and a little rice straw; in the centre of this was a round thatched building, raised on bamboos about a foot from the ground, which served as a granary; round it were small mud cottages, each to all appearance an apartment in the dwelling. In one corner was a little mill, something like a crab-mill, to be worked by a man, for separating the rice from the husk. By all which we could see through the open doors, the floor of the apartments was of clay, devoid of furniture and light, except what the door admitted."

The same writer describes a thoroughly Hindoo village in northern Bengal. The houses were scattered very prettily over a large green common, fenced off from the river by a high grassy mound, which formed an excellent dry walk, bordered with mango-trees, bamboos, and the date-palm, as well as some fine banyans. The common was covered with children and cattle; a considerable number of boats were on the beach; different musical instruments were strumming, thumping, squeeling, and rattling from some of the open sheds, and the whole place exhibited great cheerfulness. The houses were mostly very small but neat, with thin walls of mats, which, when new, always look well. One in particular, which was of a more solid construction than the rest, and built round a little court, had a slip of garden surrounding its exterior, filled with flowering shrubs, and enclosed by a very neat bamboo railing, while others were *open all round.*

The interior domestic arrangements of the Hindoos are extremely simple. Their ordinary plates and dishes are formed from the leaf of the plantain-tree or of the lotus; these are neatly sewn together with some grassy fibre, but however neatly fashioned, are never used a second time. Even in houses of a rather superior description, little furniture can be found beyond a few mats, earthen pots, grindstones, and utensils for cleaning the rice, with a swing for the amusement of the family. A few earthen pots, and two jars, the one for water and the other for oil, comprise the whole stock of a village. The cooking utensils are sometimes of brass or copper, as are likewise their drinking vessels, which are made with a spout, that they may pour out the water in a small stream, as it is thought indelicate, in drinking, to touch the vessel with the lips.

Leaving India and Asia, and embarking on the wide Pacific, we encounter a vast range of islands,—New Holland, New Zealand, Borneo, Sumatra, &c. In these the habitations of the natives, as well as their customs generally, differ according to the extent of their intercourse with Europeans. Of all human beings, the one least elevated above the beasts of the field is the New Hollander. The ingenious contrivances which mark the North American Indians, the pomp which surrounds many African barbarians, the rude paganism which, impure as it is, shows the existence of something like a consciousness of superior being among other tribes, are unknown in New Holland. Not even the rudest semblance of dress, nor the slightest approach to agriculture, mark their similarity to other men. Their huts are not even equal to the kraal of the African.

GIPSY-FORMED HUT IN AUSTRALIA.

In passing on to New Zealand, we come to a race of men, who, cannibals though they be, are still far above the wretched New Hollander. The walls of their huts are frequently formed of large twigs, covered with rushes, and are covered by a thatched roof of the same material. There is often a fence round a small enclosure attached to the hut, which is similarly made, the enclosure being appropriated to the purpose of a garden. In other cases their huts approach the form exhibited in the annexed cut.

NEW ZEALAND HUTS.

Several of the Polynesian islands are inhabited by tribes resembling more or less the New Zealanders, while others maintain a medium rank between them and the New

Hollanders. Annexed is a representation of a hut in one of the Polynesian islands.

POLYNESIAN HUT.

We now return to the mainland of Asia, and pay a visit to that remarkable country, China.

The ordinary dwellings of the Chinese bear a certain degree of resemblance to the Roman habitations disinterred from the scoriæ and ashes of Pompeii. They consist usually of a ground-floor, divided into several apartments within the dead-wall that fronts the street, and lit only by windows that look into the internal court-yard. Most of the houses near Pekin have the flue of a kind of stove or furnace in the middle of the room, on which the bed is laid to warm it in winter. In the better houses, the furnace which warms this flue is lit from without; but in the poorer dwellings the fire is in the room itself, and serves the double purpose of cooking and warmth, the whole family huddling round it.

In towns, where space is of consequence, the houses and shops of the greater number of inhabitants have a story above the ground-floor, and on the roof is often erected a wooden stage or platform for drying goods, or for taking the air in hot evenings. This custom contributes to make their houses very liable to catch and to spread fires during a conflagration. Nothing surprises the Chinese more than the representations or descriptions of the five and six-storied houses of European cities; and the emperor is said to have inquired if it was the smallness of the territory that compelled the inhabitants to build their dwellings so near the clouds. They have the most absurd superstition in regard to the ill luck that attends the elevation of dwellings above a certain height; and the erection of a gable end will fill a whole family with consternation, until certain ceremonies have been performed to dispel the "evil influence:" which ceremonies consist of sundry charms and exorcisms. Our cut represents a provincial town in China.

PROVINCIAL TOWN IN CHINA.

Throughout the great and widely-spreading region known as Thibet and Chinese Tartary, the dwellings partake of one or more of the kinds which have already engaged our notice. Where the climate is warm, and the habits of the people at all commercial, something like comfort is seen; where the northern situation brings bleak and bitter winds, desolation marks the spot; where sandy deserts prevail, roving tribes are the principal feature. We will therefore go to the north-east extremity of Asia, and visit the squalid and scantily-peopled region of Kamtschatka.

The Kamtschadales present a feature in the arrangements of their dwellings somewhat different from the inhabitants of warmer climates: that is, in having a summer residence distinct from that appropriated for winter. The summer hut is elevated from the ground in a singular manner. A number of posts about twelve feet high are stuck in the ground at regular distances; and on the top of these is placed a platform made of rafters and covered with earth. Having thus made a floor to the hut, the walls are formed of branches and twigs, rudely interlaced among one another, and a thatched roof of rushes or dried grass surmounts the whole. The object of having this singular arrangement is, that the open space between the floor of the hut and the ground may be appropriated to the reception of fish, which are hung up to dry, as the air circulates freely around them.

The winter habitations are nothing more than burrows dug in the earth, in which a mass of human beings swarm together amid dirt and filth; dogs and their masters being nearly on an equality, and the atmosphere being full of smoke from lamps. The inhabitants of these parts are perhaps the dirtiest in their habits on the face of the earth.

In advancing towards the western parts of Siberia and Russia, nothing can be more dreary and forlorn than the appearance presented. The traveller may go hundreds of miles through a cold and sterile region, without seeing the smallest trace of a human being, and then he may meet with such a comfortless habitation as we here represent.

SIBERIAN HUTS.

But we must now bid adieu to Asia, and set foot in

Europe.

It is not our purpose to treat at great extent of European houses, because there is an air of greater comfort in them than in those of the other three quarters of the globe, and this will enable us to speak of them in another supplement devoted to better dwellings, the objects of our present attention being *rude* habitations.

The northern parts of Europe, such as Sweden, Norway, Iceland, &c., present us with dwellings deficient enough, alas, in domestic comfort. Surrounded by ice and snow, the inhabitants have often difficulty in procuring the necessary articles of food, and their dwellings (the poorer class) are generally very dreary. The middle classes are, of course, better lodged.

According to Mr. Laing, the following may be taken as a sample of the dwellings of the middle or labouring class in the country or farming districts of Norway:—It consists of four walls, each composed of ten logs roughly squared with the axe, and the edges chipped off, so as to make them octagonal. They are laid one upon the other, with a layer of moss between each, which keep the interstices quite tight. The logs forming the side walls are notched above and below, and those forming the gable walls so as to correspond; thus the head of each log touches the one below it at the corners, which are as tight and strong as any part of the building. Each log is about twelve inches square. The room in which Mr. Laing dwelt for a short time had three latticed windows, with sixteen panes of coarse glass in each window. The floor and the ceiling were boarded,

the former being raised from the earth by a stone wall a foot high. The roof had a pitch of about two feet; it was closely boarded on the outside and the boards covered with birch-bark, peeled off in large flakes. Above this was laid earth, about three inches deep, retained by a ledge of the same depth along the bottom of the roof; a crop of grass or of moss, growing on this earth, made it compact. The cost of such a house as this Mr. Laing states as being not more than fifty dollars, wood and workmanship included, and as the farming labourers can make their own houses, they are, on the whole, very comfortably lodged; for these log-houses, though rough and ill-finished, are wind and water tight.

The same intelligent traveller states that the Norwegians are, generally speaking, a well-lodged people, the poorest dwelling having glass windows and separate rooms. On ordinary farms, the dwelling-house consists of three rooms below and three above; and at the end, with a separate entrance, is a better room, and another reserved for strangers. At a small distance from the family house, raised upon posts to exclude rats, is the sanctum; the gudewife's store-room and dairy, where the provisions for the year are lodged. It is large and airy, with windows, and with at least two rooms for different purposes.

In the elevated mountain-districts, the huts of the cottagers are still built of logs, like those of the farm-servants; but the poverty of the inhabitants deprives them of making their dwellings so comfortable. Still, however, good milk, cream, and butter, are plentiful within them, and the traveller or passing stranger receives a friendly welcome.

Mr. Barrow describes the miserable hovels which the Laplanders are forced to consider as *home*. "In the language of the Laplander," says he, "the hut is called *kuja*. There were three or four of these wretched buildings at short distances from each other, all alike, but two only were at present inhabited. They are constructed of birchen poles stuck in the ground in a circle of about six or eight feet in diameter, not more than the latter, with the ends brought to a point, so as to take a conical shape. The centre of the hut, or highest part under the apex, is not more than six feet. Grassy turf or sods are piled up outside the poles, and secured by a few branches of birch which rest against them; and several large stones laid outside all around the bottom of the hut add to its support. The entrance is through an opening about three feet high, which, numbed with cold, I found it somewhat difficult to creep under; but the Laplanders jumped in and out with the greatest facility. A reindeer's skin, hung loosely over the opening, serves every purpose of a door. In the centre of the hut burns the fire, and a little opening left at the top allows the smoke to escape. The heat inside, contrary to my expectation, was so oppressive, and the smell so overpowering, that I was compelled to decline taking my seat round the fire, to which I was strongly invited, as well by the occupants as by the bad state of the weather. These dwellings are so small, that the owners are unable even to keep their provisions within them; but a sort of light platform or shelf of birch twigs, placed outside the hut, and raised six or seven feet from the ground, is used as a kind of store-room for their milk and cheese, over which is placed a skin cover, to preserve them from the weather." Such is the home of a Laplander, and such we have represented in the frontispiece to this supplement.

In proceeding from Lapland to Iceland, we come to better habitations, though still of a very humble description. Indeed, the greater proportion of the houses in Reikiavik, the capital, are but one story in height. They, even the houses of the merchants, are built of wood, as in Norway, and are covered with shingles or planks, and to each is attached a store-house for the different articles in which the merchant deals. The only stone-built house is that of the governor, situated at the eastern extremity of the town, and even this building was formerly the workhouse, not for the maintenance of the indigent poor, but made use of rather as the house of correction. The episcopal residence of the bishop of Iceland is near to the coast, considerably to the eastward of that of the governor—a very comfortable house, although built of brick, and white-washed.

In descending again to the shores of Europe, we come to our own islands, replete with every kind of dwelling, from the wretched hovel of the Irish pauper, to the costly palace of Royalty.

It is a melancholy thing, and we say it without entering into the political consideration of the question, that the poorer classes of our Irish brethren are housed in a manner not a whit better than those whom we are accustomed to call barbarians in foreign lands. Mr. Barrow states that those among the pauper class who are aged, sick, or infirm, might often envy the Esquimaux or the Hottentot. "These poorest of all poor creatures find their only shelter from the weather in the most wretched of hovels, made of sods, stuck generally by the side of the public roads, thatched over with heath, shrubby branches, or anything they can get, but which are so wretchedly constructed, as to be in every corner pervious to rain: and even hovels of this kind are frequently demolished by some heartless farmer, on whose grounds they intrude.

The labouring cottars are a grade in advance, but how small a grade! "It is most melancholy to look into these abodes of wretchedness, to see a whole family worn down by disease and famine,—not a chair or stool to rest their weary limbs upon; not a bed to lie down upon, except a little straw, often wetted with the rain that drips from the roof: and a blanket (and that not always—sometimes an old tarpaulin) thrown over the whole family, to serve as a substitute for bed-clothes. From the almost constant rain that falls in this climate, the floor of these hovels is generally broken into mud-holes; a pool of water stagnates before the door, and, after a heavy shower, enters the hovel, there being generally a step *down* from the door. A few cold potatoes frequently serve as their daily and only food; for many of them are unable to purchase a constant supply of turf, to cook them at such times as they may be wanted. This is the melancholy, and, I believe, true picture, of a family reduced to the condition of labouring cottars, who are satisfied to take such employment as they can get, when famine and disease have not yet reduced them to a state of weakness which disables them from work altogether."

Even the humble shintie of the Highlander, rude as it is, is less comfortless than such scenes as we have just dwelt on. Let us hope that all our Irish brethren will one day know what comfort is.

A HIGHLAND SHINTIE.

The abodes of poverty, be they in what country they may, are but sad objects of attention, and we would not wish to dwell on them, but with a view to contrast with theirs our own conveniences for dwelling, in order to acquire and preserve a feeling of thankfulness that our habitatory condition is, as a people, generally superior to that of other days and other lands. But still we must observe that the houses of the poor of England, France, Spain, Italy, Turkey, and Germany, have many traits in common. In selecting the title of "*rude* habitations," for this Supplement, we apply it to the dwellings of rude nations, and not to the abodes of the poor of enlightened nations. We have therefore directed our chief attention to America, Asia, and Africa; and in another Supplement, devoted to habitations of a better character, we shall endeavour to do justice to the principal nations of Europe.

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LAMBETH PALACE, AND ITS HISTORICAL ASSOCIATIONS. III.

INTERIOR OF THE GREAT HALL, LAMBETH PALACE.

resume our description of this ancient palace by tice of the Great Hall.

his hall is a very noble apartment, being 93 feet , 38 feet wide, and 50 feet high. In early times, n nobles and great landholders were accustomed to rtain their retainers and dependants, the great of a mansion used to be the common room, open ll at meal and at other times. Such seems to have the purpose of the great hall at Lambeth ce, and the accounts of the stewards of the ce have handed down notices of the hall, and of the nses incurred there, for more than five hundred s. The old hall, having been repaired and reno- d from time to time, was destroyed by Scott, one of regicides, in 1648.

he present hall is believed to be situated precisely on the same spot as the old one. It was built by Archbishop Juxon, who, although he occupied the see of Canterbury but three years, expended nearly fifteen thousand pounds on Lambeth Palace. He ordered it to be built as much as possible like the old one, against the wishes and advice of others, who advocated a more modern style of building. As it was not finished at his death, he left the following clause in his will:—"If I happen to die before the hall at Lambeth be finished, my executor to be at the charge of finishing it, according to the model made of it, if my successor shall give leave."

The architecture of the hall is of a mixed kind, as well as the ornaments, though the whole is intended as an imitation of the Gothic style. The walls are chiefly built of a fine red brick, and are supported by

buttresses, edged and coped with stone, which do not terminate in pinnacles, but in large balls or globes. The roof on the outside is slated, and in the centre rises a lofty and elegant lantern, at the top of which are the arms of the see of Canterbury impaled with those of Juxon, and surmounted by the archiepiscopal mitre. The whole of the inside is profusely ornamented; the roof in particular is constructed with much labour, and was a very fine piece of workmanship for the age in which it was executed. It is composed wholly of oak, on many parts of which are carved the arms of Juxon; on others, of Juxon impaled with those of the see of Canterbury, or the arms of Canterbury alone; and on some parts, a mitre between four negroes' heads. The same arms are again seen in the large north window, above the archbishop's seat. At the lower end of the hall is a screen of the Ionic order, on the top of which is Juxon's crest, a negro head crowned.

The whole hall is wainscotted to a considerable height, and the floor is handsomely paved. Two of the great oak tables have upon them the date 1664, and, therefore, were made at the charge of Archbishop Sheldon.

Some of the early archbishops exercised great hospitality in this hall, particularly Winchelsey, Cranmer, and Parker. Of Winchelsey's liberality we have given an instance, in speaking of the *dole* at the entrance gate. The extent of Cranmer's household, and of the various duties they had to perform in maintaining the hospitalities of the place, may be judged from the following list:—steward, treasurer, comptroller, gamaters, clerk of the kitchen, caterer, clerk of the spicery, yeomen of the ewry, bakers, pantlers, yeomen of the horse, yeomen-ushers, butlers of wine and of ale, larderers, squillieries, ushers of the hall, porter, ushers of the chamber, daily waiters in the great chamber, gentlemen-ushers, yeomen of the chamber, carver, server, cup-bearer, grooms of the chamber, marshal, groom-ushers, almoner, cooks, chandler, butchers, master of the horse, yeomen of the wardrobe, and harbingers.

When Cranmer dined in state in the hall, the following was the order observed, as described by Wharton:—

There were generally three tables spread in this hall, and served at the same time. 1st. The archbishop's table, at which ordinarily sat none but peers of the realm, privy councillors, and gentlemen of the greatest quality. 2nd. The almoner's table, at which sate the chaplains, and all the guests of the clergy beneath diocesan bishops and abbots. 3rd. The steward's table, at which sat all other gentlemen. The suffragan bishops were then wont to sit at the almoner's table; and Archbishop Cranmer, in admitting his suffragan, Richard Thornden, Prebendary of Canterbury and Bishop of Dover, to his own table, did him unusual honour; which was therefore noted, to aggravate the ingratitude of that man in conspiring against the said archbishop.

Strype describes the domestic arrangements of Archbishop Parker in the palace, in the following terms:—

In the daily eating this was the custom. The steward, with the servants that were gentlemen of the better rank sat down at the tables in the hall on the right hand; and the almoner with the clergy and the other servants, sat on the other side; where there was plenty of all sorts of provisions, both for eating and drinking. The daily fragments thereof did suffice to fill the bellies of a great number of poor hungry people that waited at the gate; and so constant and unfailing was this provision at my lord's table, that whosoever came in either at dinner or supper, being not above the degree of knight, might here be entertained worthy of his quality, either at the steward's table or at the almoner's table. And moreover, it was the archbishop's command to his servants, that all strangers should be received and treated with all manner of civility and respect, and that places at the table should be assigned them according to their dignity and quality; which redounded much to the praise and commendation of the archbishop. The discourse and conversation at meals was void of all brawling and loud talking, and for the most part consisted in framing men's manners to religion, and in some other honest and beseeming subject. There was a monitor of the hall; and if it happened that any spoke too loud, or concerning things less decent, it was presently husht by one that cried silence. The archbishop loved hospitality, and no man showed it so much, and with better order; though he himself was very abstemious.

In the manuscript library at the palace, there is a register, which contains an enumeration of the various persons composing Archbishop Parker's household,—the salaries paid to them, and the respective duties attached to their several offices. After which is a detail of the order in which they sat down to meals; for it must be understood, that in the early times of which we are speaking, it was customary for the whole household, from the archbishop himself down to the servants, to dine in the great hall. The details to which we have just alluded are in the following words:—

All thes (the household) had allowance for their diett in the Hall at Lambith; as first was the steward's table on the one side for himself, his two fellow-officers, gentlemen of the horse, secretaries, gentleman-usher, that waited not at the Archbishop's table, with other gentlemen-waiters: and if al cold not sit thear thei were placed at the gentlemen's table. Next to that table, over against the steward's table on the other side of the Hall, had the Almoner his table, with the chapleins and the stewdents; and either of thes tables had like allowance of diet, manchet, and wine. The gentlemen's long table, at first sitting, was for some gentlemen of household and manors, and for the Archbishop's waiters when he had dined. On the other side against them sat the yeomen-waiters and yeomen-officers that attended not, and meaner sort of strangers. At the table next the Halldore sat the cooks and attendent yeomen-officers. Over against them sat the gromes afore mentioned of the stable and other extern places. Then at the nether end of the Hall, by the pantry, was a table, whereat was dailie entertained eight or ten of the poor of the town by turn. The sub-almoner had a chest for broken mete and brede, and a tub with broken bere, for reliefe of other poore, as they were put in bills parted among them.

Besides this, the archbishop's lady was accustomed to keep a table for the entertainment of gentlewomen, together with the younger branches of her own family, and other private persons.

The archbishop, of whom we have been here speaking (Parker), had many persons of noble and honourable birth among the members of his household, among whom were the following:—Lord Chamberlain, Egremont Ratcliffe, half-brother to the Earl of Sussex:—Charles Grey, brother to Lord Cobham:—Sir Richard Bingham:—Geoffry Benton, Privy Councillor:—John Stafford, son to Lady Stafford, Lady of the Queen's bed-chamber:—Henry Harrington, brother to Lord Harrington:—Sir Henry Maynard, and others.

The management of such a large household was conducted with the utmost precision:—the duties of every one being set down in writing, so that no mistakes might arise. For instance,—the following are part of the directions given to the ushers of the hall:—

They are to see the hall be alwaies kept sweete and and cleane, and to keepe fiers there, but with as little waste as may be, and in the night to see it either quenched, or otherwaies secured from danger of any fier in the night, and soe also of the candles. They, or one of them, are in the morning, in the winter season, at VI. of the clock, and V. in the somer, to ring the bell for warning to the people to rise, and go about their sevrall imployments. They are againe to ring the bell at VIII. in the winter season, and seaven in the somer, to warne unto prayers, whereunto all

the household servants shall repaire. They are also to ring the bell halfe an hower past X. in the forenoone and VI. in the evening; and all such of the houshold as are not necessarily employed, to attend on her grace to morning and evening prayers; and that in times of prayer such as are in the hall, are to come to divine service as comaunded them. That the tables in the hall be orderly covered by tenn in the forenoone, and presently after five in the evening; that none be absent that are appointed to waite there and fetch meate; and that they diligently doe their duties, and that all strangers be placed orderly, and according to their welth, &c. &c."

We have dwelt somewhat fully upon details connected with the great hall, because it enables us to introduce many remarks concerning the internal domestic economy of such mansions as these in the reign of Queen Elizabeth,—the large number of persons composing the household,—the custom of high and low dining in the great hall belonging to the palace or mansion,—the rigorous arrangement of persons at the different tables according to their rank in life, or the nature of their connexion with the lord of the mansion, (in the present case the archbishop of Canterbury),—the spreading of the dinner-table by ten in the morning, and the supper-table by five in the evening,—all these are memorials of times long since past.

It now becomes necessary to acquaint the reader with what has been done in the great hall within the last few years. We have purposely described the hall such as it was until about the year 1830, because it was only under that form that we could associate it with the scenes of hospitality formerly exhibited within the palace. Social economy is now changed:—the "Lord of the Palace" and his "retainers" no longer dine in the great hall, either at Lambeth or in other parts of England; and the present learned and amiable archbishop of Canterbury determined to employ as a library, the great hall, which had been so long unappropriated to any useful purpose.

Mr. Blore, the architect, has with singular skill and felicity converted the hall into the archiepiscopal library. The books are arranged on the east and west sides, and in twelve magnificent oak book-cases projecting into the room. In the recesses between the book-cases are eleven tables of carved oak, of a massive but elegant design, suited to the architecture of the hall. The library is lighted by the noble lantern in the centre,—on the west side by five pointed windows, and a bay-window at each extremity,—on the east side by five pointed windows,—and on the north and south side by a pointed window at each end, under the roof above the fire-places. The room is heated by pipes under the floor, and the warm air is admitted into the room through fourteen brass gratings between the divisions of the library. At each end of the room is a suitable fire-place; over that on the north side are painted the arms of the see, impaling the arms of Juxon, and over the other are the same arms impaling those of Secker. The old entrance to the court-yard, at the south-west end of the hall, has been converted into a bay-window; and the principal door is now at the north-east. Various portraits and coats of arms are hung round the room. Such is the state of this noble apartment at the present day.

Among the other apartments in the palace is the *steward's parlour*, or *great parlour* as it was formerly called; it is a fine noble room, as old as the time of Archbishop Cranmer, whose motto, NOSCE TE IPSUM, is painted in various parts of the large bow-window, together with the royal arms of England. The *servants' hall*, nearly adjoining it, is an apartment of the same description, and is supposed to have been built or repaired by Archbishop Bancroft.

In the *great dining room*, which measures 38 feet by 19, are preserved portraits of all the archbishops of Canterbury from Laud to Cornwallis, viz, Laud, by Vandyke,—Juxon, Sheldon, Sancroft, Tillotson, Tenison, by Dubois, Wake, Potter,—Hering, by Hogarth,—Hutton, by Hudson,—Secker, by Reynolds,—and Cornwallis, by Dance. The portraits, as Lyson observes, afford the means of observing the gradual changes in clerical dress, in the article of bands and wigs. A large ruff anciently supplied the place of the former. Tillotson was the first archbishop who wore a wig, which resembled his natural hair, and was worn without powder.

The oldest part of the palace is supposed to be a very curious *crypt* under the chapel. It consists of a series of strong stone arches, supported in the centre by a short massy column, and is 36 feet long by 24 feet wide, and the height of the roof from the ground is about ten feet. These vaults, of which the crypt consists, are now converted into cellars, but might possibly once have been used for divine service, as there is a second entrance to them from the north side of the cloisters, the principal one being from the north-east corner of the same place. At one end of the crypt are the remains of a building, supposed to have been at one time used as a bakehouse or kitchen.

There are, of course, a large number of apartments in the palace so purely domestic as not to call for description from us; these we shall therefore pass over. We may, however, remark that a large portion of them has been rebuilt by the present archbishop. We lately stated that the hall has been converted into a library; and we may add, that the guard-chamber has been converted into a dining-room, and many of the domestic offices have been entirely rebuilt. We believe that no less a sum than 60,000*l.* has been spent on these renovations by the present occupant of the see.

We have reserved for our last article on this subject, a description of two parts of the building which are deserving of particular attention, on account of the many historical circumstances associated with them. These are, the *chapel*, and the *Lollard's tower*, or *prison*. In our concluding article we shall conduct the reader through them.

KEPLER was a man of strong and lively piety; and the exhortation which he addresses to his reader before entering on the exposition of some of his discoveries, may be quoted, not only for its earnestness, but its reasonableness also.—"I beseech my reader that, not unmindful of the divine goodness bestowed on man, he do with me praise and celebrate the wisdom and greatness of the creator, which I open to him from a more inward explication of the form of the world, from a searching of causes, from a detection of the errors of vision; and that thus, not only in the firmness and stability of the earth, he perceive with gratitude the preservation of all living things in nature as the gift of God, but also that in its motion, so recondite, so admirable, he acknowledge the wisdom of the creator. But him who is too dull to receive this science, or too weak to believe the Copernican system without harm to his piety, him, I say, I advise that, leaving the school of astronomy, and condemning, if he please, any doctrines of the philosophers, he follow his own path, and desist from this wandering through the universe; and lifting up his natural eyes, with which alone he can see, pour himself out from his own heart in praise of God the creator, being certain that he gives no less worship to God than the astronomer, to whom God has given to see more clearly with his inward eye, and who, for what he has himself discovered, both can and will glorify God."—WHEWELL'S *Bridgewater Treatise*.

JOAN OF ARC, THE MAID OF ORLEANS.

JOAN OF ARC ON THE SCAFFOLD.

AMONG the females who have rendered themselves remarkable, by the performance of deeds which do not in general belong to the female character, few are so extraordinary as Joan of Arc, the Maid of Orleans.

Henry the Fifth, king of England, on his death-bed had appointed his brother, the Duke of Bedford, regent of that part of France which he had conquered by force of arms. The duke had determined to carry on those schemes of conquests which had been so successfully begun by Henry, and for this purpose had laid siege to Orleans, which at that time commanded the communication with the south of France; consequently, as this town was of the utmost importance, the Dauphiny of France resolved to make the most vigorous defence. The attack, however, was so successfully carried on by the English, that the dauphin gave over the place for lost, and began to entertain thoughts of retiring into Languedoc and Dauphiny, with the remainder of his forces. The queen was much opposed to this plan; and while he was in doubt and uncertainty as to what course to pursue, a country maiden came to him, and offered her assistance for the deliverance of Orleans and of France.

This maiden was Jeanne d'Arc, (Joan of Arc,) a native of a little hamlet near the river Meuse. She was the daughter of humble peasants, and was born in a district remarkable for the simplicity and religious fervour of the inhabitants. The year of her birth is supposed to have been 1410; and she spent some of her early years in the employment of a seamstress. She ultimately quitted this occupation, and hired herself as servant at an inn in the neighbouring town of Neufchatel, where she remained five years. She was of a very enthusiastic and religious temperament, and although her personal beauty and amiable manners were calculated to make her the delight of every one, she yet preferred solitary musings, in which she gave loose to the reveries of her imagination. The state of France was at that time very wretched, and occupied the attention of all classes; and there was a popular rumour or legend afloat, that a virgin should rid France of her enemies. This operated on the enthusiastic mind of Joan, and she fancied she heard voices addressing her, and calling on her to redress the wrongs of her country. This was of course purely imaginary; but there is abundant evidence of the sincerity and purity of mind with which the gentle girl gave herself up to these reveries.

She was about thirteen years of age when she first became subject to these imaginary impressions. She used to say that the vision appeared to her as a great light, accompanied by a voice, telling her to be devout and good, and promising her the protection of Heaven; to which she responded by a vow of eternal chastity. These feelings took a religious turn in the first instance; but as she grew in years, and made observations on the state of her native country, her thoughts turned towards patriotic subjects, and she fancied herself to be the virgin who was to succour France. The account that she gave was, that *voices* were her visiters and advisers, and that they prompted her to quit her native place, take up arms, drive the foe before her, and settle the young dauphin on a throne, which was as yet very insecure. Influenced by this phantasm, she seemed to regret the physical weakness of her sex, and applied herself to manly exercises, particularly in the management of her horse, in which she eventually equalled the boldest cavalier.

Influenced by the feelings here described, she applied to Baudricourt, governor of Vaucouleurs, and made a simple narration of what appeared to her to be divine inspiration. Baudricourt at first refused to see her; but when he did consent, and listened to her tale, he treated her with contempt, and dismissed her. She then returned home, but continued firmly to insist that the virgin, whom popular rumour said was to deliver France, must be herself.

At last that particular state of things arrived, when Orleans was closely besieged, as we before stated; and it then occurred to Baudricourt that Joan's enthusiasm might be made of some account. He purchased a horse, male attire, (at her own request,) and various accoutrements for her, and, accompanied by two gentlemen and an escort, she set out from Vaucouleurs, on the 13th of February, 1429, to go to Chinon, where the dauphin had encamped. After a dangerous journey of eleven days, she arrived at Chinon, and communicated her errand to the dauphin.

The dauphin, although he was much in want of assistance, hesitated to accept aid which looked so much like sorcery; and Joan had great difficulties to encounter before she could gain his confidence. It was then determined by the dauphin and his court to give Joan's pretensions as much as possible the appearance of divine interposition in favour of France. Joan herself was undoubtedly artless and sincere, however chimerical; but the dauphin only thought how he might turn her enthusiasm to advantage. On the 29th of April, mounted on a white steed, she conducted a convoy of provisions to Orleans, and succeeded in conveying them into the besieged city, in spite of the English.

Her entry into Orleans was quite a triumph: the soldiers believed that Heaven had directly interposed in their favour, and they became reanimated at once; and the English, who had hitherto defeated the French in every engagement, became paralyzed at the effect produced by a young and simple girl. She sent a herald to them, warning them to depart, or she would slay them. This exasperated the English, and they vowed vengeance; but Joan made frequent sallies from the besieged city, and drove the besiegers from every post,—her presence inspiring the French soldiers with an enthusiasm which nothing could resist.

In the mean time a portion of the French army, which had been left to follow after Joan, arrived at Orleans, and determined Joan at once to make an effort to drive off the English completely from the town. On the 6th of May, after sending a second summons to the English to depart, she renewed her attack upon their forts. Her soldiers being compelled to retreat, the English took courage and pursued them; upon which Joan crossed the river in a boat, and her appearance at once frightened the English from the open field, and drove them behind their ramparts. Here Joan resolved to besiege them in her turn. She seized a scaling-ladder, and was about to mount, when an arrow pierced her in the shoulder. Momentary weakness stayed her; but seeing that her presence was necessary to cheer the soldiers, she bore up against her wound, urged her soldiers on, and compelled the English to raise the siege and depart,—thus fulfilling, in less than a week's time, the promise that she had made to save Orleans.

Joan immediately requested permission to pursue her success by driving the English from all the other towns. She at first met with some opposition, but at length gained her point. The result was a continued series of defeats, by which the English were driven from one town after another, their army terribly thinned, and some of their best generals killed. At last, on the 16th of July, the town of Rheims was taken by Joan, and on the following day the dauphin was crowned king in the cathedral: this was one of the exploits that Joan had sworn to accomplish.

It has been said by some writers, that Joan requested permission to retire to her native village after having achieved all that she promised. But the king would not allow it. He caused all possible honours to be rendered to her; a medal was struck, commemorative of her deeds, and letters of nobility were granted to herself and every one of her family. In September she resumed the command of the army, and led an attack against Paris, which was hostile to the king; but here she sustained defeat for the first time, and was pierced through the thigh by an arrow.

After this, many engagements ensued, which do not merit particular notice; but we now come to one which was the termination of her extraordinary career.

On the 23rd May, 1430, the town of Compiègne was besieged by the combined forces of England and Burgundy. Joan defended the town; and in making a sally against the enemy, was captured, and delivered into the hands of the Burgundian general, and carried to the fortress of Beaurevori, near Cambray. From this place she attempted, in vain, to escape; and was afterwards handed over to the English, and conducted to Rouen. The University of Paris demanded that she should be tried on the charges of witchcraft and sorcery, and the king of England issued letters, authorizing the trial to take place.

A long course of interrogatory was then carried on, in order to convict Joan from her own confessions. The articles of accusation stated, that she pretended to have had visions from her thirteenth year,—to have been visited by the archangels Gabriel and Michael, and the saints Catherine and Margaret, and to have been accompanied by these celestial beings to the presence of the dauphin; that she pretended to know St. Michael from St. Gabriel, and St. Catherine from St. Margaret; and that she had assumed male attire by the order of God. These were the charges against her, and it is probable that they did not much exceed the length to which the excited imagination of the enthusiastic girl carried her. But what was only enthusiasm on her part, her prejudiced and vindictive judges chose to attribute to sorcery, and therefore heresy, and sentenced her to be burned alive.

But many of the confederates thought imprisonment was a sufficient punishment, and much discussion and negociation arose on this point. She was offered pardon, on condition that she acknowledged her visions to be false, forswore male habits and arms, and confessed herself to have done wrong. This she firmly refused to do, and was conducted to the scaffold. Momentary weakness induced her to beg for life: she was conducted back to prison, and resumed female habits. But in two days she reproached herself for her weakness, and openly avowed that she would maintain her former resolution. The result of this was that she was conducted to the market-place at Rouen, on the 31st of May, 1431, placed on a pile of wood, a cap placed on her head, and the pile ignited.

Thus perished the enthusiastic girl, to the eternal disgrace of all parties, especially the king whom she had befriended, and who made scarcely any intercession in her favour.

ON ROCHE ROCK, IN CORNWALL.

To yon huge rock, that age and storm defies,
As o'er Cornubia's heathy back they haste,
Admiring wanderers turn with curious eyes,
And mark its bulk amid the frowning waste.

High on its bending top, with woods o'ergrown,
His cold damp cell a hermit rais'd in air;
His drink the spring, his bed the naked stone,
And gave his years to penance and to prayer.

There to his void and aching soul confined,
He listened to the sea-bird's piercing cries,
The tide's wild warring, and the wrecking wind,
And watched the sun's slow journey thro' the skies.

The wakeful memory of life's cheerful stage
Oft chilled religion's faint and dying flames;
Ev'n as he traced the legend's pictured page,
To steal his thoughts from heaven the tempter came.

Still 'mid the lonesome wild, whence pleasures fly,
Imperious nature's cries the heart alarm,
Warm recollection pours the deep-felt sigh,
And life's sweet charities ev'n there must charm.

Alike from virtue and from vice he fled,
Lost to the world as in the silent grave,
Save when his ready hand a bit of bread,
A cup of water to the pilgrim gave.

Did heaven, in kind regard to feeble man,
Pour down his various bounties from above,
And give, to cheer his short and mingled span,
The sweets of friendship and the joys of love;

That he, a prey to voluntary woe,
'Mid cold austerities should drag his life,
Turn sullen from the plenteous feast, nor know
Th' endearing names of children, father, wife?

Yet stupid penance has in ev'ry clime
Her dark-eyed vot'ries far from nature led,
Taught them to mount the column's height sublime,
And to fierce suns expose the throbbing head;

Whole years to sit unmoved, to bend oppress,
Beneath the massy collar's iron load,
To pine with abstinence and pale unrest,
And barefoot, tread the desert's length'ning road.

As sullen superstition veiled their eyes
They felt not, knew not, God's all bounteous plan,
Who, binding all his works by mutual ties,
Made man the brother and the friend of man.

Religion mild and merciful he gave,
To be his solace in a world of pain,
From dark despair and grov'ling vice to save,
The prop of social virtue, not the bane:

That urged by sympathy and glowing zeal,
To all mankind he might his love impart,
Partake their joys, and for their sorrows feel,
And drive each selfish passion from his heart

REV. ED. HAMLEY.

WOMAN'S MISSION.

[WE resume our extracts from this beautiful little volume.]

WHAT then is the true object of female education? The best answer to this question is a statement of future duties; for it must never be forgotten, that if education be not a training for future duties, it is nothing. The ordinary lot of woman is to marry. Has anything in these educations prepared her to make a wise choice in marriage? To be a mother? Have the duties of maternity,—the nature of moral influence,—been pointed out to her? Has she ever been enlightened as to the consequent unspeakable importance of personal character as the source of influence? In a word, have any means, direct or indirect, prepared her for her duties? No! but she is a linguist, a pianist, graceful, admired. What is that to the purpose? The grand evil of such an education is the mistaking means for ends; a common error, and the source of half the moral confusion existing in the world. It is a substitution of the part for a whole. The time when young women enter upon life is the one point to which all plans of education tend, and at which they all terminate: and to prepare them for that point is the object of their training. Is it not cruel to lay up for them a store of future wretchedness, by an education which has no period in view but one; a very short one, and the most unimportant and irresponsible of the whole of life? Who that had the power of choice would choose to buy the admiration of the world for a few short years, with the happiness of a whole life? the temporary power to dazzle and to charm, with the growing sense of duties undertaken only to be neglected, and responsibilities, the existence of which is discovered perhaps simultaneously with that of an utter inability to meet them? Even if the mischief stopped here, it would be sufficiently great; but the craving appetite for applause once roused, is not so easily lulled again. The moral energies, pampered by unwholesome nourishment,—like the body when disordered by luxurious dainties,—refuse to perform their healthy functions, and thus is occasioned a perpetual strife and warfare of internal principles; the selfish principle still seeking the accustomed gratification, the conjugal and maternal prompting to the performance of duty. But duty is a cold word: and people, in order to find pleasure in duty, must have been trained to consider their duties as pleasures. This is a truth at which no one arrives by inspiration! And in this moral struggle, which, like all other struggles, produces lassitude and distaste of all things, the happiness of the individual is lost, her usefulness destroyed, her influence most pernicious; for nothing has so injurious an effect on temper and manners, and consequently on moral influence, as the want of that internal quiet which can only arise from the accordance of duty with inclination. Another most pernicious effect is, the deadening within the heart of the feeling of love, which is the root of all influence; for it is an extraordinary fact, that vanity acts as a sort of refrigerator on all men, on the possessor of it, and on the observer.

Now if conscientiousness and unselfishness be the two main supports of women's beneficial influence, how can any education be good which has not the cultivation of these qualities for its first and principal object? The grand objects, then, in the education of women ought to be, the conscience, the heart, and the affections; the developement of those moral qualities, which Providence has so liberally bestowed upon them, doubtless with a wise and beneficent purpose. Originators of conscientiousness, how can they implant what they have never cultivated, nor brought to maturity in themselves? Sovereigns of the affections, how can they direct the kingdom whose laws they have not studied, the springs of whose government are concealed from them? The conscience and the affections being primarily enlightened, all other cultivation, as secondary, is most valuable. Intelligence, accomplishments, even external elegance, become objects of importance, as assisting the influence which women have, and exert too often for unworthy ends, but which in this case could not fail to be beneficial. Let the light of intellect, and the charm of accomplishments, be the willing handmaids of cultivated and enlightened conscience. Cultivate the intellect with reference to the conscience, that views of duty may be comprehensive, as well as just; cultivate the imagination still with reference to the conscience, that those inward aspirations, which all indulge, more or less, may be turned from the gauds of an idle and vain imagination, and shed over daily life and daily duty the halo of a poetic influence; cultivate the manners, that *the qualities of heart and head* may have an additional auxiliary in obtaining that influence by which a mighty regeneration is to be worked. The issues of such an education will justify the claims made for women in these pages; then the spirit of vanity will yield to the spirit of self-devotion; that spirit confessedly natural to women, and only perverted by wrong education. Content with the sphere of usefulness assigned her by nature and nature's God, viewing that sphere with the piercing eye of intellect, and gilding it with the beautiful colours of the imagination, she will cease the vain and almost impious attempt to wander from it. She will see and acknowledge the beauty, the harmony, of the arrangement which has made her physical inferiority (the only inferiority which we acknowledge) the very root from which spring her virtues and their attendant influences.

Removed from the actual collision of political contests, and screened from the passions which such engender, she brings party questions to the test of the unalterable principles of reason and religion; she is, so to speak, the guardian-angel of man's political integrity, liable at the best to be warped by passion or prejudice, and excited by the rude clashing of opinions and interests. This is the true secret of woman's political influence, the true object of her political enlightenment. Governments will never be perfect till all distinction between private and public virtue, private and public honour, be done away! Who so fit an agent for the operation of this change as enlightened, unselfish, woman? Who so fit, in her two-fold capacity of companion and early instructor, to teach men to prefer honour to gain, duty to ease, public to private interests, and God's work to man's inventions?

And shall it be said that women have no political existence, no political influence, when the very germs of political regeneration may spring from them alone, when the fate of nations yet unborn may depend upon the use which they make of the mighty influences committed to their care? The blindness which sees not how these influences would be lessened by taking her out of the sphere assigned by Providence, if voluntary, is wicked—if real, is pitiable. As well might we desire the earth's beautiful satellite to give place to a second sun, thereby producing the intolerable and glaring continuity of perpetual day. Those who would be the agents of Providence must observe the workings of Providence, and be content to work also in that way, and by those means which Almighty wisdom appoints. There is infinite littleness in despising small things. It seems paradoxical to say that there are no small things; our littleness and our aspiration make things appear small. There are, morally speaking, no small duties. Nothing that influences human virtue and happiness can be really trifling, and what more influences them than the despised, because limited, duties assigned to woman? It is true, her reward (her task being done) is not of this world, nor will she wish it to be. Enough for her to be one of the most active and efficient agents in her heavenly Father's work of man's regeneration—enough for her that generations yet unborn shall rise up and call her blessed.

IF it be objected that expansion of mind will unfit women for their minute and peculiar duties, it may be answered that the objection is no less unphilosophical than false. Do we not see the electric fluid which shakes the spheres, operating upon the growth of the meanest plant? Are not the mathematical truths which guided Newton in the discovery of the solar system, available to the child in the construction of his Chinese puzzle? It is ridiculous to talk of extension occasioning imperfection; in falsehood, indeed, extension of limit only adds to extension of error, but a fundamental truth is to be recognised by its powers of infinite and universal application. It is not because women's powers have been cultivated and enlarged, that they overlook their minute duties; but because they have been only partially cultivated, and enlarged in a wrong direction. There is no cause to dread that expansion of mind will lead to neglect of minor and proximate duties. That is the peculiar danger of exaggeration of sentiment, against which expansion of mind is proposed as a defence. Exaggeration of sentiment, even when inclined to the side of virtue, has a false foundation; and we have seen, that no principle, not fundamentally true, can be trusted, in unlimited operation. The reasoning power will show us that we can, in no degree, compensate to society for the neglect of those duties that lie nearest us; or secure peace to our own minds, except by the performance of them. "Do the duty that lies nearest thee," says the German sage. Oh! that we could all make

this the motto of our heart and of our life, and do the duty that lies nearest us, with all our heart, and all our mind, and all our soul, and all our strength.

The besetting sin of our age is a kind of Epicurean selfishness. An increased value of physical enjoyment, a kind of material atmosphere engendered by the stupendous progress of physical science, produces a rooted, though unavowed, scepticism, as to the value of the unseen and ideal. The love of life crushes the belief of that most important of all truths, that there are things more valuable than life itself. The lofty indifference to mere physical enjoyment; the preference of others to ourselves; of the unseen to the present; of the ideal to the tangible; which, where they do exist, attest the strivings of the Divinity within us; where will they soon be? Yet, so completely does the Divinity oppose the infringement of his laws, that they, and they only, are happy people who do live for the ideal. He seems to take pleasure in asserting the superiority of his works, by not allowing its noblest and purest reflections of himself to be obscured by intervening shadows. It is the fashion to sneer at those *ideas*, for which men in differing ages have suffered toil, pain, privation, death: the object might be wild—the recovery of a shrine; weak—the love of a woman; untrue, (if we are to believe the infidel,) the announcement of a world beyond the grave; be it so: poor victims of idiosyncracy! they sacrificed all tangible and solid benefits for a vapour.

But who are they, at whose names the eye flashes and the cheek colours, whose memories leave behind them a train of light, like a glorious departing orb? The successful speculator? the luxurious Epicurean? the wealthy? the worldly? no;—the oppressed but dauntless victim of tyranny; the devoted, though perhaps mistaken, sufferer for fantastic loyalty; the agonized martyr to truth. And for personal happiness, let one of the foremost of these victims of idiosyncracy speak for himself, in his own noble words,—"We are troubled on every side, but not distressed; we are perplexed, but not in despair; persecuted, but not forsaken; cast down, but not destroyed:" and contrast them with the mournful confession of him, who, having exhausted all that this world has to bestow,—glory, honour, power, wealth,—bequeathed to us, as the melancholy result of his experience, that they were "altogether vanity."

The missionary spirit is neither more nor less than the direction of this ideality into its best and noblest channels. It is the union of two qualities which are necessary in the moral regeneration of our race. The character of the ideal is, indeed, noble in its postponement of self, but it must be useful likewise, before we have the missionary spirit. In a word, love must be added to unselfishness; it must not be passive and unresisting, but active and enduring unselfishness; not simply the going out of self, but the going into others,—the imitation, as far as human nature allows, of that divine perfection of love, whose bliss must be in blessing. This spirit may, in some degree, be acquired by cultivation; but there is one natural manifestation of it, and that is placed in woman's heart,—maternal love,—the only purely unselfish feeling that exists on this earth; the only affection which (as far as it appears) flows from the loving to the beloved object in one continual stream, uninterrupted by those impediments which check every other. Disease, deformity, ingratitude,—nothing can check the flow of maternal love.

By intrusting to woman such a revelation of himself, God has pointed out whom he intends for his missionaries upon earth,—the disseminators of his spirit, the diffusers of his word. Let men enjoy in peace and triumph the intellectual kingdom, which is theirs, and which doubtless was intended for them; let us participate its privileges, without desiring to share its dominion. The moral world is ours,—ours by position; ours by qualification; ours by the very indication of God himself, who has deigned to place in woman's heart the only feeling, (that we know of, here existing,) which affords the faintest representation of his most unextinguishable love to us, his erring and strayed children; the only affection which enables the possessor to love on through sin and folly; and even when sin and folly have brought their last, worst, consummation.

Oh! those who know, those who have witnessed the lingering yearning of a mother's love, after one lost in crime, and wandering, and ingratitude; when even the father's heart was turned to stone; the unextinguished, unextinguishable sentiment, lighting up even the dying eye, and breathed forth in the dying prayer, can alone judge of these things. Who that has witnessed these scenes, (and how many have witnessed them whom the world thinks happy,) can doubt where the regenerating principle lies, can doubt that it is in the sex which is permitted to be the depository of a feeling so typical of the Divine love!

Blessed are the poor in spirit: what an inexplicable annunciation! How mean says the sceptic. How grand says the Christian. The poverty upon which the blessing is here pronounced, is not a feeling of degradation, but of aspiration. It is our earnest of futurity,—our patent of nobility! We are poor in spirit *here*, because we would be the sons of God *hereafter*; because we are permitted to view and love the holiness, which we feel our inability to reach. This poverty of spirit is one modification of unselfishness, and the root of it is love to God; the fruits of it will be love likewise,—love to man,—and love produces self-forgetfulness, and self-forgetfulness produces happiness. Here we have a fact accounted for, and a mystery solved. The fact is undoubted, and so generally acknowledged that a reference to it seems almost too trite and common. It is the manifest insufficiency of worldly blessings for the production of happiness—because they are a gratification of the selfish principle. Earthly and animal enjoyment is an unspeakably benevolent boon of the Creator; but not, in itself, happiness.

Happiness, properly so called, is only to be found, as has before been shown, in the accordance of the divine and human will; in the exercise, then, of those faculties of the soul by which we are approximated to the divinity. Happiness, therefore, must derive its source from the unselfish principle: a proof, that however degraded our nature may be, it still retains the impress of Him "who made man in his own image." What are acknowledged to be the purest sources of felicity here below?—The affections. And what are the affections but unselfishness? Oh! why are these pure and holy sources of felicity so little cultivated, so little understood, as means not only of enjoyment, but of moral renovation? Why do we, by our unregenerate tempers and paltry selfishness, so often turn to bitter this one drop of unalloyed sweetness that is mingled with the draught of life?

[*Woman's Mission.*]

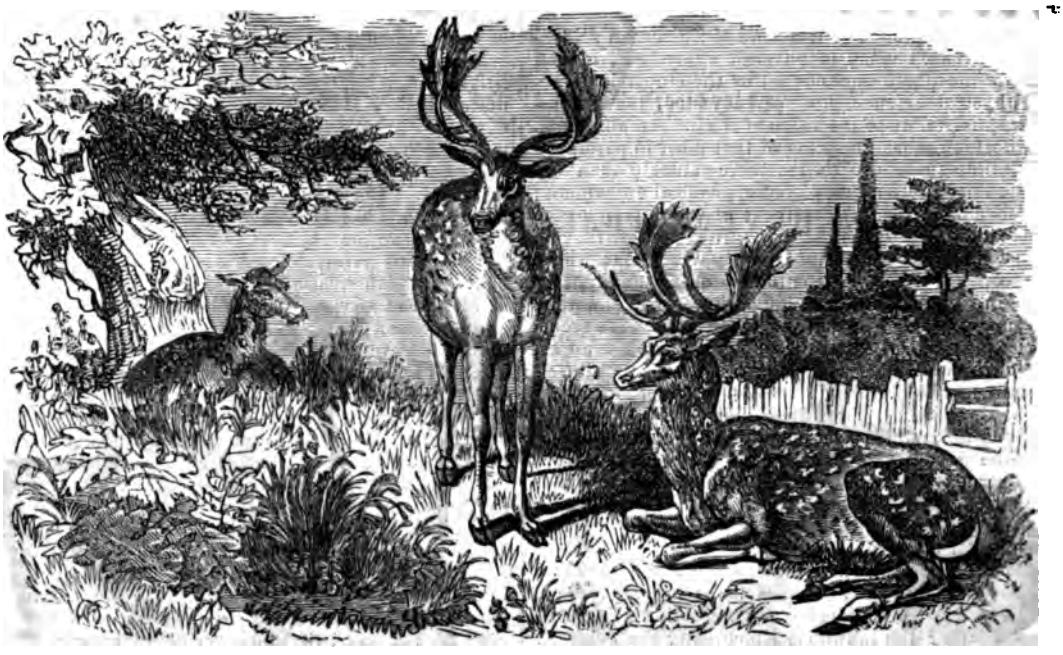
EPISTLES FROM PLINY THE YOUNGER TO SABINUS, TO WHOSE FAVOUR HE WOULD RESTORE AN OFFENDING SERVANT.

Your freed-man (who had provoked you, as you tell me,) applied himself to me, and fell down before me, as if it had been your own person. He wept profusely; he implored earnestly, and then was a long time silent; in short, he convinced me of his penitence. I am persuaded he is really amended, because he is sensible of his fault. You are angry; I know it: you are justly angry; I know that too: but there is the brightest triumph of a good temper, when there is the greatest cause of indignation. You had a respect for the man, and I hope will revive it; in the mean time, it is enough for me, if you allow him a pardon. You may, if he relapses, be again displeased; and this will be more excusable after you have been once solicited. Give some indulgence to his youth, his tears, your own humanity; disquiet him and yourself no longer, for I know it is a torment to a person of your good nature to keep up resentment. I am afraid I shall not appear so much to entreat as to compel, if I add my importunity to his; yet I will venture to add it, and so much the more freely and forcibly, as I severely reprimanded him, and strictly threatened I would never intercede for him again. This I expressed to him who was to be terrified, but not to yourself; for, perhaps, I shall again interpose and prevail for him, if the occasion be of such a nature as will become me to request and you to grant it.—Farewell.

II. *On the good success of his former Letter.*

You have done me a pleasure in receiving your freedman who once was dear to you, upon my recommendation, into your house and esteem again. You will reap a satisfaction from it: it is a considerable one to me to find you tractable in your passion, and pay this deference to my sentiments, as well as this regard to my desires. I commend and thank you; but at the same time I advise you to make proper allowances hereafter to the faults of your servants, though none should intercede for them. Farewell.—*Pliny's Epistles.*

FALLOW DEER.



These beautiful animals are the species of deer bred in parks for the production of venison, as well for the private use of the great and opulent as for sale. The male is called a buck, the female a doe; the offspring of both a fawn. The buck is furnished with horns, which he sheds yearly; the doe has no such weapons for self-defence.

The buck sheds his horns from the middle of April through the first week in May, which are in part regenerated by the month of September. The doe generally produces her young in the last week of May, or during the first two of June. The season for buck-venison commences in July, and goes out about Michaelmas, when doe-venison comes in, and continues till January.

Buck hunting was formerly a much more frequent sport than at present. The uncertainty and short duration of the chase rendered it far inferior to the chase of the stag; and even the latter has long been on the decline.

The buck is, the first year, called a *fawn*; the second, a *pricket*; the third, a *sovel*; the fourth, a *sove*; the fifth, *a buck of the first head*; the sixth, *a great buck*. The female is, the first year, called a *fawn*; the second, a *tegg*; and afterwards, a *doe*.

The fallow-deer is smaller than the red-deer, of a brownish bay colour, whitish beneath, on the insides of the limbs, and beneath the tail. The horns of the buck are palmated, and are thus strikingly different from those of the stag. No two animals, nevertheless, can be more nearly allied in form than the stag and the fallow-deer, and yet no two animals keep more distinct, or avoid each other with more fixed animosity.

They are never seen to herd in the same place, they never engender together, or form a mixed breed; and even in those countries where the stag is common, the buck seems entirely a stranger; in short, they both form distinct families; which, though seemingly near, are still remote; and, although, with the same habitudes, yet retain an unalterable aversion. The fallow deer, as they are much smaller, so they seem of a nature less robust and less savage than those of the stag kind. They are found, but rarely, wild in the *forests; they are in general* bred up in parks, and their flesh is supposed by some to be preferable to that of any other animal.

These animals associate in herds, which sometimes divide into two parties, and maintain obstinate battles for the possession of some favourite part of the park: each party has its leader, which is always the oldest and strongest of the flock. They attack in regular order of battle; they fight with courage, and mutually support each other; they retire, they rally, and seldom give up after one defeat. The combat is frequently renewed for many days together; till after several defeats, the weaker party is obliged to give way, and leave the conquerors in possession of the object of contention.

As the buck is a more delicate animal than the stag, so also is it subject to greater varieties. We have in England, two varieties of the fallow-deer, which are said to be of foreign extraction. The beautiful spotted kind, which is supposed to have been brought from Bengal; and the deep brown sort that are now so common in many parts of the kingdom. These were introduced by King James I., from Norway; for having observed their hardiness, and that they could endure the winter, even in that severe climate, without fodder, he brought over some of them to Scotland, and disposed of them among his chases. Since that time, they have multiplied in many parts of the British empire; and England is now become more famous for its venison than any other country in the world. Whatever pains the French have taken to rival us in this particular, the flesh of their fallow deer, of which they keep but a few, has neither the fatness nor the flavour of that fed upon English pasture.

All deception in the course of life is indeed nothing else but a *lie* reduced to *practice*, and *falsehood* passing from *words* into *things*.——South.

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THE DEVEREL BARROW, DORSETSHIRE.

URNS FOUND WITHIN THE BARROW.

Most persons, who inhabit a region abounding with open downs, must have frequently observed artificial hillocks, of a conical or pyramidal form, of various sizes, and often surrounded by a slight depression of the ground, which is the remnant of a ditch. They are called *barrows*, or *tumuli*, (which latter word is the Latin for *hillocks*) and they are the monuments of the formerly illustrious, but now unknown dead,—of ancient chiefs, princes, heroes, and other persons of distinction, whose names and exploits have long since been forgotten, and whose tombs are the only relics that still remain, attesting the insignificance rather than the greatness of human beings, whether civilized or rude.

The barrow is the most ancient, the most simple, and the most durable, kind of monument. It remains from age to age almost unchanged; while elegant and ingenious works of art, proud temples and lofty towers, splendid palaces, and vast cities, sink down and crumble into dust, and leave scarcely a landmark that may point out their site.

The barrow, as may be supposed, was the first kind of mausoleum ever adopted. It is simply an enlarged grave; and when a person's whole property, cattle, slaves, &c., were buried with him, the grave would necessarily be enlarged, and become what is termed a *barrow*. Owing to its great simplicity, the barrow seems to have been adopted by almost every nation during its infancy; and hence barrows are found in almost every part of the habitable world. They are not confined to any country: there is perhaps not a region without them. The most civilized parts of Europe have barrows; and in the most lonely wilds of America barrows are found. The material of barrows is usually earth; but, where stone was abundant, it would very naturally be chosen, as being harder, and apparently more durable. The pyramids of Egypt, and other countries, are but immense stone barrows. The great antiquity of barrows has been inferred from their being mentioned by Homer. One of the most ancient known barrows is that of Halyattes, the father of Crœsus, near Sardis, now called Sart, in Asia Minor. It is described by Herodotus, who says:—"The foundation, or bottom part, is of great stones, but the rest of the sepulchre is a tumulus of earth. Its circumference was more than three-quarters of a mile."

In England, tumuli, or barrows, are generally found on uncultivated downs and hills, and many of them are often arranged in a line, stretching over the hills,

sometimes for miles. Most of the barrows in this country must be ascribed to the aboriginal Britons, though some may mark the sites of battles fought in the Saxon times. After large battles, both sides often buried their dead in barrows; and thus, as the losing party gradually retired, it left behind a line of tumuli, marking its course. Most barrows, however, are the mausoleums of British chiefs or heroes, or the common burying-places of large and distinguished families. Great numbers of barrows are generally found in the neighbourhood of stone circles, cromlechs*, rocking-stones†, and other druidical remains. Thus, they are very abundant near the temples of Stonehenge and Abury, on Salisbury Plain, and in other parts of Wilts and Dorset. There is an elevated ridge or chain of chalk hills, which commences at Bindon in Dorsetshire, and, running due east, quite through the isle of Purbeck, terminates abruptly in a bold promontory, between the bays of Swanage and Studland. This chain bears marks of having been formerly a populous region. Near its eastern extremity it is very elevated, and bears a cluster of barrows; and on its northern slope there stands, near Studland, an immense druidical altar, called the AGGLESTONE, consisting of a block of iron sandstone, computed to weigh four hundred tons, placed on a tumulus, and surrounded by an artificial morass. From this spot, throughout its whole length, which extends many miles, the ridge presents a succession of tumuli and other earth-works; and at its western extremity is a lofty insulated hill, crowned by the remains of a large city, of an oblong shape, formerly enclosed by a stone wall, whose foundations still remain, and are in some parts eighteen feet thick. The vicinity of Dorchester also appears to have been a region of importance. About eight miles east of Dorchester, near the great Western road, stands a remarkable barrow, which was opened in November, 1825, and was found to contain some curious relics, which were deposited in the museum of the Bristol Literary Institution.

It is situated on a small elevated piece of ground, called DEVEREL DOWN, from which five or six British and Roman encampments or stations are visible, in various directions: these are placed on insulated hills, and surrounded by circular or square earthworks. The Deverel barrow, as this tumulus is called, is about fifty-five feet in diameter at the bottom, and its height, before being opened, was twelve feet above the surrounding level. Its summit was not a flat surface, but very rough, and broken into hillocks, so that it had probably been frequently opened in search of treasure, and perhaps a portion of its contents had already been removed. The down, on which it stands, slopes considerably towards the south; but a level plateau had been formed, on which the barrow stands. This plateau is bounded on the south by a small bank or step about a foot high, which compensates for the slope of the down, and makes the spot on which the barrow stands quite level.

On beginning to open this barrow, it was found to consist entirely of a heterogeneous mass of flints, charcoal, and broken pottery, and it was probably reduced to this confused state by previous explorers, who removed all the ornaments, and other articles of value, and destroyed a portion of the rude clay urns, and such articles as were considered worthless. Thus it is probable that the rich store of ancient vases, which were found entire, was only a small part of the original number contained in this barrow; the larger part of whose contents had been reduced to a disorderly mass of shapeless fragments, by the rough usage of those who only opened the tumulus in the hopes of finding treasure.

On examining more minutely, however, a compact bed or pavement of flints, firmly wedged together, was found, constituting, as it were, a floor to the barrow. The central part of the mound was therefore dug away, down to this floor, which was on the natural surface of the earth. When the central part had thus been removed, a singular spectacle appeared. On the level compact floor, just described, were arranged twenty large stones, of various irregular shapes and sizes. They were placed in a semicircular form, and the two extreme stones were much larger than the others. There were also three other smaller stones, not forming part of the general crescent, but placed by themselves. On removing some of the smaller stones, and on digging down to a lower level, it was found that immediately beneath each stone was a rude earthenware vase, placed in a *cist*, or case, cut in the solid chalk, and covered by the stone. In this manner each stone of the great crescent covered a vase, except the two large end stones, which are therefore concluded to be altars. They are each about four feet long, and of a conical shape, but one is placed upright, like a sugar-loaf, and the other is laid flat.

The vases, or urns, contained each the ashes of a human being, mixed with charcoal, which also constituted a great part of the substance of the barrow, and was probably the result of the funeral piles. The urns thus buried under the stones of the great crescent were not eighteen in number, but only sixteen; because at two different places it was found that two adjoining stones did not cover two urns, but that they concealed a third stone, beneath which was an urn. All the other stones, however, had each a separate vase. One of the three stones, separate from the crescent, as described above, also concealed an urn: the other two had none; but near one of them were found two rude cups; one containing a very rich earth, the other the bones of a bird.

There were also four urns found buried in the floor of flints, but not covered by stones. Three of them fell to pieces, but the remaining one was the largest of the whole assemblage, and differed from all the others in being placed with its mouth downwards. This made a total of twenty-one urns, of which seventeen have been preserved, principally entire, but a few in large fragments.

Besides these, there were found nine burnt skeletons, not in vases. Five were placed in graves, cut in the chalk, but not covered by stones; and four were simply collected in a heap on the floor of the tumulus, making in all thirty specimens of human remains. With the exception of the broken pottery, &c., distributed through the barrow, this constituted the whole of its contents. There were no weapons, nor costly ornaments, and not a single piece of any metal. This proves the great antiquity of the tumulus, which was probably made at that very remote period when our barbarous ancestors had not yet had intercourse with more civilized nations. The stones were apparently in the rude forms of their natural state, and bore no marks of any iron tool; and the urns were equally rude, some of the ornaments being evidently indentations formed by the human hand, nails, &c., in the soft clay. They were not made on a potter's wheel, or turned in a lathe, or they would have been more circular. The mouldings and zigzag ornaments were probably formed by the end of a pointed stick or bone. The various devices on the vases indicate a considerable time to have elapsed between the formation of the most rude and the most ornamented urn;

* See *Saturday Magazine*, Vol. VI., p. 64.
† Ibid, Vol. VI., p. 23.

thus allowing time for a considerable improvement in the manufacture. Hence the barrow has been inferred to be a family-vault, belonging to some British chief; so that the interments happened at very different periods.

The remains which are merely placed on the floor are probably the oldest; then those in cists or graves; then those placed in *rude* urns; and lastly those in more ornamented urns, and covered by stones. The pottery was black, friable, and rough, containing coarse white sand, and even small sea-shells. The makers of it were unacquainted with the art of augmenting its hardness and durability by the action of artificial heat; for it was only partially baked in some places by the fire of the funeral piles. Like all other unburnt, or simply sunburnt pottery, the damp had penetrated it, and rendered it so perishable as to fall to pieces on being touched; so that, to prevent its crumbling, it was necessary, before moving them, to dry or partially bake them, by keeping up a fire for a few hours, round the urn, in its original place in the cist. In the cut at the head of this article, which represents a few of these vases, two will be perceived cracked almost asunder, and having holes made in them on each side of the crack. This was the state in which they were found, and the holes were probably made to receive rivets or ligatures, (probably some animal sinews, which have long since perished) to bind the broken vase together. This proves the earthenware to have been, at the time of the burial, very costly; otherwise broken and mended vases would not have been employed.

It is to the zeal and industry of W. A. Miles, Esq. that we owe the exploration of the Deverel barrow: to this gentleman also are we indebted for our account of the Kimmeridge Coal Money, described in a former article.

UPON HEARING A LUTE FIRST TUNED, AND THEN EXCELLENTLY PLAYED ON.

The jarring strings made so unpleasant a noise while the instrument was tuning, that I wonder not at the story that goes of a grand signior, who, being invited by a Christian ambassador to hear some of our music, commanded the fiddlers to be thrust out of his seraglio, upon a misapprehension that they were playing when they were but tuning. But this rare artist had no sooner put an end to the short exercise he gave our patience, than he put us to the exercise of another virtue; for his nimble and skilful fingers made one of the innocentest pleasures of the senses to be one of the greatest, and this charming melody does not so properly delight as ravish us, and renders it difficult to moderate the transports of our passions, and impossible to restrain the praises that express our satisfaction. So that if this musician had been discouraged by the unpleasant sounds that were not to be avoided, whilst he was putting his lute in tune, from proceeding to his work, he had been very much wanting to himself, and to save a little pains had lost a great deal of pleasure and applause.

Thus, when the faculties and passions of the mind, either through a native unruliness, or the remissness of reason and conscience, are discomposed, he that attempts to bring them into order, must expect to meet, at first, but an uneasy task, and to find the beginning of a reformation more troublesome for the time than the past disorders were. But he is very little his own friend if he suffers these short-lived difficulties to make him leave his endeavours unprosecuted; for when they have reduced the untuned faculties and affections of the soul to that pass which reason and religion would have brought them to, the tuned and composed mind affords a satisfaction, whose greatness does even at present abundantly recompense the trouble of procuring it, and which is yet but a prelude to that more ravishing melody, wherein the soul (already harmonious within itself) shall hereafter bear a part; where the harps of the saints accompany the glad voices that sing the song of the Lamb, and the hallelujahs of the rest of the celestial choir.—Boyle.

The women who are to be the regenerators of society must be Christian women,—Christian wives and Christian mothers, but enlightened Christians, deeply imbued with the spirit of Christ; not nominal Christians, making religion (though consoling to themselves) contemptible to those around them, by their narrow and limited acceptance of its truths. They must show forth that it is a grand comprehensive principle, which embraces all things from the greatest to the least, not only our safety, but our honour, our happiness, our ultimate glory. Let them deeply engraft these principles on the hearts of their children. It is true they cannot command results, but they will have done their duty.

Would they be restrained by a fear of injuring the worldly interests of their children, by the inculcation of these unworldly principles, so little needed for worldly advancement? Let them learn that godliness has the promise of this world as well as of that to come. If it be true (and the consent of ages proves it so) that happiness is not to be found in selfish gratification, it may be as well to seek it elsewhere. We may see how completely religion is adapted to the nature of man by observing that even the elements of enjoyment, (and they are many, though fleeting,) which this world contains, are never fully tasted but by religious persons. Those abundant sources of pure delight which are to be found in the heart, the intellect, and the imagination, are never received in their fulness but by them; and why? because they are the germs of their future and more glorious being, and can only flourish in a soil akin to that ultimately destined for them.

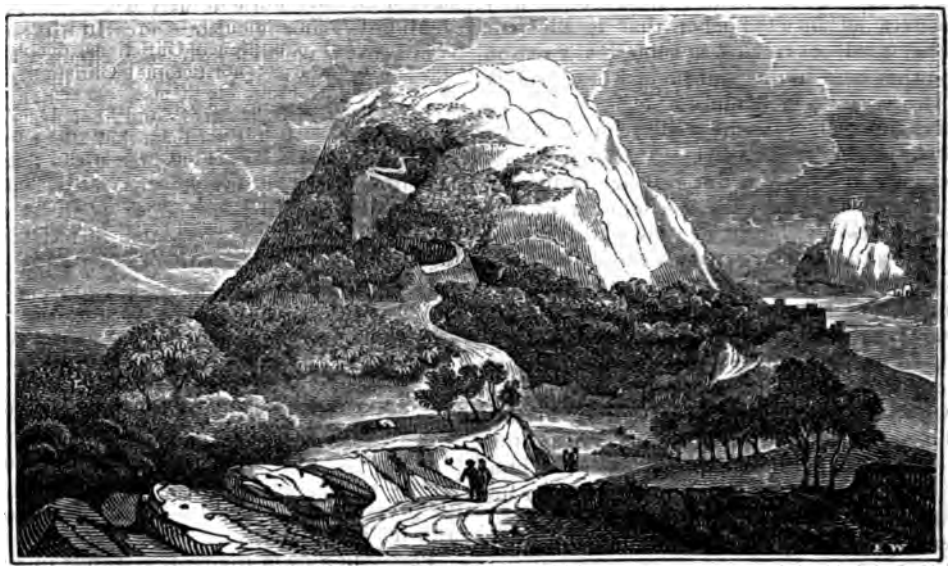
In a worldly mind, like plants removed from their original soil and climate, they exist indeed, but with a blighted existence, and produce, but how degenerate is their production! Everything that wants religion wants vitality. Philosophy without religion is crippled and impotent; poetry without religion has no heart-stirring powers; life without religion is a complex and unsatisfactory riddle; the very arts which address themselves to the senses, never proceed so far towards perfection as when employed on religious subjects. Religion, then, can be no obstacle to enjoyment, since the only sources of it which are confessedly pure, are all enhanced by its possession. Even in the ordinary commerce with the world, what a blessing awaits an exemption from the low and sordid spirit, the petty passions and paltry feelings which abound in it!

The truth is, that the religious heart enjoys more keenly all that others enjoy, and has, besides, an added and superior joy of its own:

> He is the happy man, whose life e'en now
> Shows somewhat of that happier life to come.

And as to the effects of this unworldly spirit on worldly success, it is frequently not so adverse as may be thought: but, putting aside that view of the question, let us ask what a Christian mother can consider prosperity to be but the discipline which may fit her children for their true and final home, their ultimate and glorious destiny? No effort of hers can secure to her child the good things of this world, but she may put him in possession of a principle which will add double zest to them, if possessed, and supply their absence, if wanting. Is any other principle thus comprehensive, thus embracing every possible contingency of future life? How can we doubt, when we see a religion given to man, bearing so completely the stamp of all the operations of providence, "simplicity of principle, and universality of operation;" once thoroughly received into the soul, it is the *elixir vitæ* of it; securing to the possessor the certainty of peace, securing to others consistency of action, and exhibiting in all things that unity of design which is the stamp of all great works, divine as well as human.—*Woman's Mission.*

I confess that the majesty of the Scriptures confounds me. The sanctity of the Gospel speaks powerfully to my heart. Examine the works of the philosophers, with all their pomp. How they sink into insignificance before it! Is it possible that a book, at once so sublime and so simple, can be the work of men? Moreover, to suppose a number of men to have combined in composing this book, rather than that one only should have supplied the subject of it, would be to strain, not to remove the difficulty: it would in fact be rendering it only the more incomprehensible. The Gospel indeed displays the character of truth, at once so grand, so luminous, so perfectly inimitable, that the inventors of it would be yet more wonderful than the hero.—J. J. R.



MOUNT TABOR.

MOUNT TABOR, or Itabyrius, is also called the mount of the Transfiguration, from the supposition that on this mountain our Saviour ascending with Peter, James, and John, was transfigured before them, in order that they might behold his glory, and receive, in the voice from heaven, the assurance of his Divine origin and commission,—"This is my beloved Son, in whom I am well pleased: hear ye him."

Mount Tabor, or Thabor, is situated two leagues south-east of Nazareth, rising out of the great plain of Esdraelon at its eastern side. This mount has a singular character: it is almost entirely insulated, and its figure is that of a truncated cone. Pococke describes it "as one of the finest hills he ever beheld, being a rich soil that produces excellent herbage, and is most beautifully adorned with groves and clumps of trees." The ascent is easily made by a winding road. Some authors say its height is four miles; others about two miles; but, when speaking of the height of the mount, the length of the winding ascent is frequently mistaken for it. Buckingham names one thousand feet as its elevation; but from the circumstance mentioned by Burckhardt of thick clouds resting on it in the morning in Summer, and his being an hour in ascending it, there is reason to think that Buckingham's estimate is too low. The top of the mount, which is about half a mile long and nearly a quarter of a mile broad, is encompassed by a wall, which Josephus built in forty days; there was also a wall along the middle of it, which divided the south part, on which the city stood, from the north part, which is lower, and is called the *meidan*, or place, being probably used for exercises when there was a city here, mentioned by Josephus under the name of Ataburion. Within the outer wall, on the north side, are several deep fosses, out of which it is probable the stones were dug to build the walls; and these fosses seem to have answered the purposes of cisterns to preserve the rain-water, and were also some defence to the city. There are also a great number of cisterns under ground, for a similar purpose. To the south, where the ascent was easiest, there are fosses cut on the outside to render the access to the walls more difficult. Some of the city gates remain: to the west is *Bab-el-houah*, the gate of the winds; and a small one to the south is called *Bab-el-kubbe*, or the arched gate. Burckhardt traced a thick wall, constructed of thick stones, quite round the summit of the mount and close to the edge of the precipice: on several parts of it he found the remains of bastions. The area is overspread with the ruins of private dwellings, built of stone with great solidity. The strong walls erected by Josephus seemed necessary to the security of the fortress on the top of the hill, which had been taken by Antiochus, king of Syria, as also afterwards by Vespasian.

Saint Jerome is the authority which fixes the scene of our Saviour's transfiguration on this mountain. It is remarkable that so many of the principal events of Scripture are represented by those who undertake to show where everything was done, as having taken place in grottoes; even in such cases where the condition and the circumstances of the actions themselves seem to require places of another nature. We have already had occasion, in our article on Bethlehem, to refer to this subject. "Certainly," says Pococke, "grottoes were anciently held in great esteem, or else they could never have been assigned, in spite of all probability, for the places in which were done so many various actions. Perhaps it was the hermit's way of living in grottoes, from the fifth or sixth century downwards, that has brought them ever since to be in so great reputation." Thus, on the east part of Mount Tabor are the remains of a strong castle; and within the precinct thereof is *the grotto*, in which are three altars in commemoration of the three tabernacles which Peter proposed to build, and where the Latin fathers always celebrated their holy rites on the day of the transfiguration. A magnificent church is said to have been built here by the royal Saint Helena, which served as the cathedral when this town was made a bishop's see. There was formerly a convent of Benedictine monks here; and, on another part of the hill is a monastery of Basilians, where the Greeks have an altar, and perform their service on the festival of the transfiguration. On the side of the hill is shown a church in a *grotto*, where it is said Christ charged his disciples not to tell what things they had seen, until after he was glorified.

That Mount Tabor is indeed the scene of the transfiguration admits of considerable doubt. Setting

aside the positive fact that Roman Catholic legends rest in general upon a very weak foundation, we may repose ourselves in the confidence that to the true Christian the word of God is a sufficient "reason for the hope that is in him;" and that, if he sincerely believe in the events and promises of the Gospel, it really matters but little as to the scene of those events or the precise spot of ground where those promises were made. Doubtless it is interesting, eminently so, to be informed of the present condition of the land wherein the Gospel for all nations was first promulgated: but we must distinguish carefully between Divine and human authority: the events and promises of the Gospel rest on the former: the knowledge of the localities of those events rest on the latter; and, in the case before us, the authority is very suspicious, namely, St. Jerome. Indeed, we have no scriptural authority for assigning Mount Tabor as the scene of the transfiguration, but on the contrary. We read that our Saviour took with him Peter, and James, and John, and brought them up "into a high mountain apart," whence it seems to have been erroneously implied that the mountain must be Tabor, the word *apart* being applied to the isolated position of the mountain. Now it appears from the original Greek (*kat' idian*) that the word *apart* applies to the *persons*, and not to the mountain. The same term frequently occurs in the Gospel narrative, and is always understood in the sense of *privately*, or *by themselves*. Besides, in the time of our Saviour, Mount Tabor was the scene of a busy population, its fortress was considerable, and could not have been selected on account of its privacy. The reader may therefore fairly doubt the authority which assigns Mount Tabor as the scene of the transfiguration.

Hasselquist says,—

After travelling two hours from Nazareth, we began to ascend Tabor, cooled by its agreeable dew and refreshed by the milk of its fine herds of goats. It was a league up to the top, stony and difficult; but we did not, however, dismount. On the top of it is a fine plain, the sides of it rocky. The hill is round, hath no precipices, is about four leagues in circumference, beautiful and fruitful.

Among the productions of Mount Tabor we may enumerate the oak, the carob-tree, the turpentine-tree, the holly, the myrtle, the ivy, oats, onion, artichoke, sage, rue, wormwood, saxifrage, poppy, &c. Here also exist red-partridges, the rock-goat and the fallow-deer. Burckhardt speaks of ounces and wild boars. Van Egmont describes a tree whose blossom resembled that of the orange-tree, and had the same fragrant smell; but the leaves were something like those of the linden-tree, and the fruit is gathered to make rosaries.

From the top of Tabor, (says Maundrell,) you have a prospect, which, if nothing else, will reward the labour of ascending it. It is impossible for man's eyes to behold a higher gratification of this nature. On the N.W. you discern at a distance the Mediterranean, and all round you have the spacious and beautiful plains of Esdraelon and Galilee. Turning a little southward, you have in view the high mountains of Gilboa, fatal to Saul and his sons. Due east you discover the sea of Tiberias, distant about one day's journey. A few points to the N. appears that which they call the Mount of the Beatitudes. Not far from this little hill is the city Saphet; it stands upon a very eminent and conspicuous mountain, and is seen far and near.

Beyond this, part of the snow-capped Anti-libanus chain is seen: to the south-west is Carmel, and the hills of Samaria to the south.

The hill of the Beatitudes is said to be the place where Christ delivered his "Sermon on the Mount," which begins with the peculiar *blessings* awarded to those who are favoured of heaven. It is contained in the fifth, sixth, and seventh chapters of Saint Matthew. Near this hill the multitude is said to have been once miraculously fed.

Mount Tabor is calcareous. In the mornings of summer it is covered with thick clouds which disperse towards mid-day. A strong wind blows during the day, and at night the dews are very copious. In 1810 Burckhardt found on the summit a single family of Greek Christians, refugees from Ezra in the Haouran, who had sought this retired spot to avoid taxes. They rented the upper plain at the annual rent of fifty piastres from the Sheikh of Daboury, to which village the mountain belongs.

The harvest which they were now gathering in was worth about twelve hundred piastres, and they had had the good fortune not to be disturbed by any tax-gatherers, which would certainly not be the case next year, should they remain here.

On a rising ground at the foot of Mount Tabor westward, is situated a mean village called Deboura, or Tabour, a name said to be derived from the celebrated Deborah mentioned in the book of Judges, the prophetess having directed Barak to encamp here with his host.

Proceeding from the foot of Tabor in a north-west direction, the traveller arrives at the village of Eksall, or Zal, supposed to be the Xaloth mentioned by Josephus as one of the boundaries of Lower Galilee. It stands on a low ridge of rock, and near it are many sepulchres, some like stone coffins above ground, others are cut into the rock like graves, some having stone covers over them. Buckingham found about twenty of these covered sepulchres still perfect; and in one, whose closing block had been so moved aside as to leave an opening through which the interior of the grave could be seen, a human skull remained perfect.

Mount Tabor is now called by the Arabs *Djebel Tour*.

LEAF OF A TREE AT COPANG, IN TIMOR ISLAND.

Some of the sailors had procured a rude but sweet native instrument on shore, and the governor's nephew showed us the way in which it was played. It was merely the leaf of a tree, of sufficient firmness to retain the form into which it was bent, and three strings were passed through the two ends; the tone being produced in the same manner as on a guitar. A musical person on board afterwards accomplished several airs by ear, which he played with the bow of a violin.

The leaf of this tree is very useful to the inhabitants of Copang; they make their drinking cups out of it, and their pails for carrying water. The ends of the leaf are drawn partially together, and fastened and made firm by a stick, whilst the edges are nicely stiffened by a broad hem of its own. A string is fastened to the centre of the stick, which is hung on a pole and carried across the shoulder, one before and one behind the bearer. These leafy pails are of a beautiful colour, more yellow than green, and when filled with water look cool and refreshing, and from their mode of carrying them have a most graceful appearance.—*Two Years at Sea*, by Jane Roberts.

A Good Rule.—When Sir Christopher Wren was building St. Paul's Cathedral he caused the following notice to be affixed to several parts of the structure:—"Whereas, among labourers and others, that ungodly custom of swearing is too frequently found, to the dishonour of God, and contempt of authority; and to the end that such impiety may be utterly banished from these works, which are intended for the service of God and the honour of religion, it is ordered that profane swearing shall be a sufficient crime to dismiss any labourer that comes to the call; and the clerk of the works, upon sufficient proof, shall dismiss them accordingly; and that if any master, working by task, shall not, upon admonition, reform the profanation among his apprentices, servants, and labourers, it shall be construed his fault, and he shall be liable to be censured by the commissioners."

THE FIRE-FLY IN AMERICA.

IGNORANCE AND SUPERSTITION OF AN IRISH FAMILY.

THE diminutive insect, the fire-fly, is found, I believe, in all parts of the torrid, as well as in the countries situated in the warmer regions of the temperate, zones; and, in most instances, where they are known at all, during the summer months, when the nights are dark and damp, these tiny intermittent specks of sparkling light may be seen in vast numbers, flitting about in every direction. They are common in all the inhabited parts of North America, which it has been my lot to visit during the summer season; and this I mention because the anecdote I am about to relate occurred in that country. The Americans, in common parlance, call the fire-fly "lightning bugs," *bug* being a general term with them for almost every species of winged insect, except in some of the larger sorts, as, for instance, butterflies, *mammoth* moths, and devils' needles.

An Irish family, from the county of Clare, arrived in our neighbourhood about the middle of June, in order to take possession of a lonely little farm, which a short time before had been occupied by the brother of Dennis, (the name of the new comer,) who had caught a fever, which terminated fatally. Having had no family of his own, Dennis, as next of kin, became heir to "a landed estate." The tidings of the brother's death no sooner reached Dennis, than he sold his "cow and his pig," bade adieu to his dear "county Clare," crossed the "broad Atlantic," and with his wife and family, after encountering perils on sea and land, arrived at last in the secluded valley of the Choconut. Dennis's new residence was situated in a very lonely place, near the spot where two mountain-creeks united, and surrounded on all sides by hills of considerable elevation. Through a long succession of bygone centuries these streams had annually washed down a portion of soil from the uplands, until at length a meadow of a few acres had been formed at their confluence; which space, having been cleared of its timber by some adventurous American backwoodsman, (who afterwards sold it to the brother of Dennis,) formed the site of the humble log-building now occupied by Dennis and his family.

What actually took place respecting the fire-flies, I will relate, as nearly as I am able, in the precise words of Dennis's eldest daughter, who during several years was a servant in my family; but I will not attempt to give it in the pure Irish phraseology in which she used to relate it.

"The first night we came to uncle Thomas's farm, when it grew dark we all huddled round the fire of logs in the chimney-corner: not that we were cold, for the weather was warm and sultry, but because we were strange and lonesome, and did not like the thoughts of uncle Thomas's grave being so near the house; for it was not over a stone-throw from the little back window. Father, however, got up, and opened the door to look out, just when mother was lighting the holy candle (for we had brought two of them all the way from Baltimore); but father quickly shut the door again, and whispered to us that he had seen *the fairies*. Some time afterwards he and I ventured to look from the little back-window in the chamber, when such a sight as we beheld I am sure was never seen in old Ireland! at least, so we then thought; for all around the house, and up the whole length of the meadow, we saw what we then believed to be, scores upon scores of fairies. Mother, and *my younger* brothers and sisters, could not be prevailed upon to look out at all; so we all agreed to lie down together upon the little chamber-floor, and we left the holy candle burning in the outer room, for the fairies to dance round, until daylight returned, when we knew they would all disappear.

The whole of next day, father and mother were both very down-hearted, and said, had they but known as much as they *then* knew, they never would have left dear old Ireland; and we were all ready to die with fright, as night drew near, at the thoughts of the fairies. Towards evening, however, Mike Riley, who lives in the upper part of the valley, whom we had seen on our way to our new place, called in on his way home from the grist-mill, and enquired kindly how we all did, and how we were pleased with our new place. Father was not long in telling him all about our having seen the fairies, and enquired of Mike if *he* had ever seen them since he came to live in that part of the country? Mike Riley answered, that he believed there might be a few fairies about in the woods, but from the description my father had given of the sights we had seen, he said they must have been what the Americans call lightning-bugs, some sort of glow-worms with wings on. This, however, we none of us would believe; so Mike, seeing that we were mightily bothered about these same fairies, consented to remain with us until after dark, and so go home when the moon rose. Sure enough, in less than an hour after the sun went down, many of the lights we had taken for fairies began to show themselves down by the creek by the side of the wood, and shortly after they were visible all over the meadow, but the thickest we thought around uncle Thomas's grave. We all got very much frightened, save Mike Riley, who laughed heartily, and said, if we would go out with him, he would catch some of the lightning-bugs, and convince us that they were not *real* fairies. But we all said we had rather not; so Mike went out into the meadow alone, and presently returned with three or four of the little things in his hand, which he had caught as they settled on the long reeds by the side of the creek. He brought them into the chamber where there was no light; and, sure enough, when they lifted their under-pair of little wings, their backs were as bright as sparks of fire. 'Now,' said Mike Riley, 'are you all satisfied that what you saw last night were not *real* fairies?' We all said we were, because Mike had a long way to go to his home, and we did not wish to detain him any longer; but it was many a long day after we came to live on the Choconut before we were quite entirely satisfied in our minds that the fire-flies were not *real* fairies."

Though Dennis's family ere this may have ceased from feeling alarm at the appearance of a few little innocent fire-flies, yet I much doubt if any of them will outlive the superstitions they carried with them from their dear "county Clare;" since several years subsequent to their taking possession of "uncle Thomas's farm," they continued to burn their "holy candles," on particular occasions, and to practise sundry other superstitious rites, in order to guard themselves against the machinations of "the fairies;" and yet, in spite of all this, when any little mischance occurred in their household concerns, you invariably heard them blaming "the fairies" for it. J. B. B.

PAUSANIAS, a few days after the victory of Platæa, prepared two repasts, one costly and luxurious like the table of Mardonius (the *Persian* General), the other plain and frugal, after the Spartan mode—then comparing, he exclaimed to his officers—"What a madness was it in Mardonius who was used to such a luxurious diet, to come and attack a people like us who know how to live without dainties and superfluities, and want nothing of that kind.

THE MECHANICAL POWERS.

I.

.....Industry approached,
And roused him from his miserable sloth;
His faculties unfolded; pointed out
Where lavish Nature the directing hand
Of Art demanded; showed him how to raise
His feeble force by the mechanic powers,
To dig the mineral from the vaulted earth,
On what to turn the piercing rage of fire,
On what the torrent, and the gathered blast;
Gave the tall ancient forest to his axe;
Taught him to chip the wood and hew the stone,
Till by degrees the finished fabric rose.—THOMSON.

THE advance of man from barbarism to civilization is marked by those increasing efforts of reason, from which result so many comforts to himself, and an improved appearance in everything around him. He no longer wastes his strength in rude and unassisted attempts to overcome the refractory qualities of matter; but he gradually invents machines and acquires the art of directing them, so as to ensure the most advantageous expenditure of his powers. These simple machines, most of which were probably the offspring of unrecorded ages, we are about to describe in their more improved form and more efficient mode of application. These are called "the mechanic powers," and they enter into the construction of machines generally; and regulated as they are by certain simple natural laws, they may be said to form the foundation on which the noble superstructure of mechanical philosophy has been erected.

By a mechanical power we mean some contrivance whereby the natural power of a man or animal may be directed or varied. Thus, a man cannot by his unassisted force, cleave a large block of stone asunder, but by using a mechanical power he can not only effect this, but many other apparently difficult operations. But in truth, the power of a man or animal cannot be augmented by any artificial means; it is only applied in a different manner, so as to produce effects in a larger or more easy manner than those which it ordinarily produces. The general effect of force applied to any body is to produce a motion in that body: now if the body to be moved remain the same, but the force applied to it be increased, the effect will be an increased quantity of motion, that is, a greater velocity. The greater the force the greater is the velocity, provided the weight to be moved remain the same; but the same power which produces only a small degree of velocity, in a body of great weight, and consequently difficult to move, will produce a much greater velocity in a body of much smaller weight, and which will therefore be more easily moved. With the same absolute power, therefore, the smaller the load or weight to be moved the greater is the velocity, and *vice versâ*. On the same principle, the force possessed by a moving body is proportional both to its weight and to its velocity. The force of a small body moving very rapidly, may be equal to that of a large body moving slowly. Hence arises the great superiority of cannon-balls projected with immense velocity by the force of gunpowder, over the immense battering rams used in ancient times, which were only moved by men, with a comparatively small velocity. The absolute effect of a missile is found by multiplying the weight and velocity together. For instance, if the weight of a battering ram be five thousand pounds, and it be moved along by the soldiers with a velocity of twenty feet in a second, which is probably a greater velocity than could possibly be produced in practice, the *momentum*, or moving impulse of such a mass, or its tendency to push down the wall against which it is moved, would be expressed by 5000 × 20, that is, 100,000 lbs. Now, if the average rapidity of a cannon-shot be taken at two thousand feet in a second, a fifty-pound shot will be equal in effect to this great battering ram; for 50 × 2000 gives 100,000 lbs., the same force as that produced by the battering ram. This explains why fortifications must be now made much stronger, and in a different manner to what they were before the invention of gunpowder.

Now to apply this principle to any mechanical power. If it be required to make a small moving power move a great weight, we must diminish the velocity of the latter, and increase that of the former, in order that its momentum may be equal to that of the heavier but slower body: this may be effected in a great many different ways. It is customary to reckon *six* mechanical powers for effecting this, viz., the lever, the wheel, the pulley, the inclined plane, the wedge, and the screw. But the first two of these certainly act on the same principle, and are only different modifications of the same instrument; and the last three are also only different forms of the inclined plane, so that the whole may be resolved into three principles, or laws.

Of these laws, the first, which relates to the lever and the wheel, is that, if any body or system of bodies revolves on a certain fixed point, called its *centre of motion*, or on a certain fixed line called its *axis*, those bodies or parts of the body which are furthest from that axis or centre, move more rapidly than those which are nearer to the axis or centre. The velocity with which any part of a revolving body moves, is exactly proportional to its distance from the centre or axis; so that if two bodies revolve round the same centre, and are connected by an inflexible bar, and if one of them be at the distance of four feet from the centre, while the other is at the distance of only two feet, the former will move with twice the velocity of the latter.

The reason of this will be evident by considering that the circumferences of two circles bear the same ratio to each other as their radii. The circumference of every circle is about equal to six times the radius; therefore the body which is fixed at four feet from its centre or axis of motion, describes a circle whose radius is four feet, or circumference six times four, or twenty-four feet. But the body placed at a distance of two feet from the centre, only moves round a circle whose radius is two feet, or whose circumference is twelve feet. Thus the former body moves through a space of twenty-four feet, in exactly the same time that the latter moves through a space of only twelve feet, and it must therefore possess twice the velocity of the nearer body, so that if the weights be equal it will possess twice the momentum.

It is on this principle that the action of the two most extensively used mechanical powers depends, namely, the lever, and the wheel and axle.

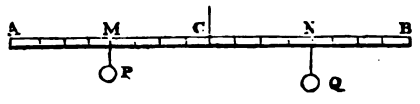
1. THE LEVER.

THIS mechanical power is so simple, that its principles seem naturally implanted in the mind of man. When we wish to move or lift a weight that would otherwise be too heavy for us, or to overcome a strong resistance, we naturally make use of the first article that comes in our way, as a *lever*, or *lifting* power, as the word implies, being derived from the Latin through the French, from a word which signifies *to raise easily*. This is an operation rather of instinct than of reason; there seems to be no reflection used, and the rudest savage would not apply the lever in the wrong manner, so as not to use his strength to the best advantage.

The lever, which is said to have been invented by

Archimedes about 220 years B.C., is nothing more than an inflexible bar of some substance, resting on one fixed point called the *fulcrum*, or prop, which serves as its centre of motion. It matters not what may be its shape; but, in order to perform experiments conveniently with it, let the reader provide himself with a straight stick or bar, sufficiently strong and stiff to sustain a considerable weight without breaking or bending. Let a notch be cut exactly in the middle of its length, so that if suspended by a string tied round this notch, the stick may balance itself and remain quite horizontal. Divide the bar into a number of equal parts, say inches, beginning at the middle point, and setting them off each way to the two ends of the bar, as in the following figure.

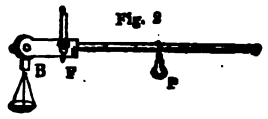
Fig. 1.



Now, every one knows that if two equal weights be hung on this lever, one at each end, the bar will not move, but remain balanced; but, if they be unequal, that which is heavier will preponderate and sink, and the lighter end will rise. But this only holds good as long as the two weights are equally distant from the fulcrum, or point of suspension C. If the two weights be not at the same distance from the fulcrum, that which is furthest from it will appear to weigh heavier than the other, although, in reality, the weights are equal. Thus, if you move the weight P to the end A, it will overbalance the other weight Q, although its weight is still the same; and you will find that it will require the weight Q to be made twice as heavy, before it can balance the weight P. Thus you can make a weight of one pound at A balance two pounds at Q; because the distance C A is twice as great as the distance C Q; and of course, whatever weight you hang at A, it will require twice that weight to be hung at Q, to balance it. If the distance C A were five times as great as C Q, then the weight Q must be five times as heavy, as the weight at A; and the same with any other number. If you hang a weight of ten pounds on one arm of the lever, at the distance of two inches from the fulcrum, and then hang a weight of two pounds on the other arm, sliding it backwards or forwards till it balances the ten pounds, you will find that it will do so only at the distance of ten inches. In the same way you may make any number of similar experiments, and you will always find that if each weight be multiplied by its distance from the centre, the products of the two weights will be equal. For instance, in the last mentioned example, the ten pounds multiplied by its distance, two inches, produces twenty; and the other weight, two pounds, multiplied by its distance, ten inches, also produces twenty. In this manner, if you have the distance of one weight given, you may always find the distance of the other. Suppose a weight of three pounds be hung on one arm, at the distance of four inches from the centre, and it is required to find at what distance a weight of two pounds must be hung on the other arm so as to balance it. Here the weight, three pounds, multiplied by its distance from the fulcrum, four inches, produces twelve; and in order that two pounds may produce twelve, it must be multiplied by six; so that the distance of the two pound weight must be six inches; and, accordingly, you will find upon trial, that three pounds at four inches, will balance two pounds at six inches.

A common pair of scales is a lever of this kind, but the distances of the weights (in a true pair of scales), are always equal; and, therefore, in order to produce equilibrium, the weights must be equal also. But, if the beam of a pair of scales had one arm longer than the other, the articles placed in the scale hanging from the longer arm, will seem heavier than they really are; and thus badly disposed persons, using such articles, might cheat those whom they deal with, Sometimes, however, it is found convenient to use a balance, having one arm a great deal longer than the other, as in the case of the weighing-machines, used at turnpike-gates, to weight loaded carts and wagons. Here it would be very inconvenient to use weights of some tons, which must be done, if a common balance were used. The arm, therefore, which bears the platform on which the vehicle rests, is much shorter than the other, which only bears a small scale. A pound therefore, placed in this scale, might be made to balance a ton on the platform, and the other weights in proportion; so that a large loaded wagon can be weighed with as much ease as a small article only weighing a few pounds. The principles of the lever are also taken advantage of in the steel-yard used by butchers and others, which is represented in this figure.

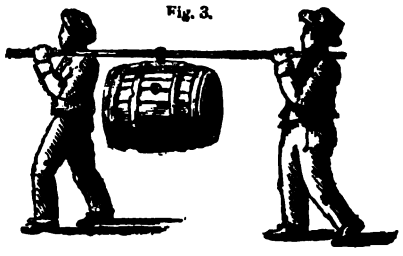
Fig. 2



Here the fulcrum is at F, and the articles to be weighed are placed in the scale or suspended from a hook, at B. Only one weight P is used, and this is slid backwards and forwards on the longer arm. Suppose this weight weighs a pound, and that each of the divisions on the longer arm is equal to the whole of the shorter arm B F. Then, if the weight be placed at the first division from F, it will be at the same distance from F as B is; therefore, the article suspended at B, must weigh one pound. But if the weight P, be moved to the third division, its distance from the fulcrum will be three times that of B; therefore, the weight at B must be three times that at P, or three pounds. In fact, the number of divisions between F and P, always indicate the weight of the article in the scale B, in pounds; and for fractions of a pound, the divisions are subdivided into halves, quarters, &c.

When two men at the distance, say of nine feet from each other, carry a tub, weighing, say 180 pounds, upon a pole; if the point at which the cask is hung, be three feet from the shoulder of the first, and six feet from the shoulder of the second, then, on the principle already laid down and illustrated, the first man sustains a pressure twice as great as the second man. The first bears a weight of 120lbs., and the second a weight of only 60; the proof of which is that 120lbs. × 3 ft. = 60 lbs. × 6 ft.

Fig. 3.



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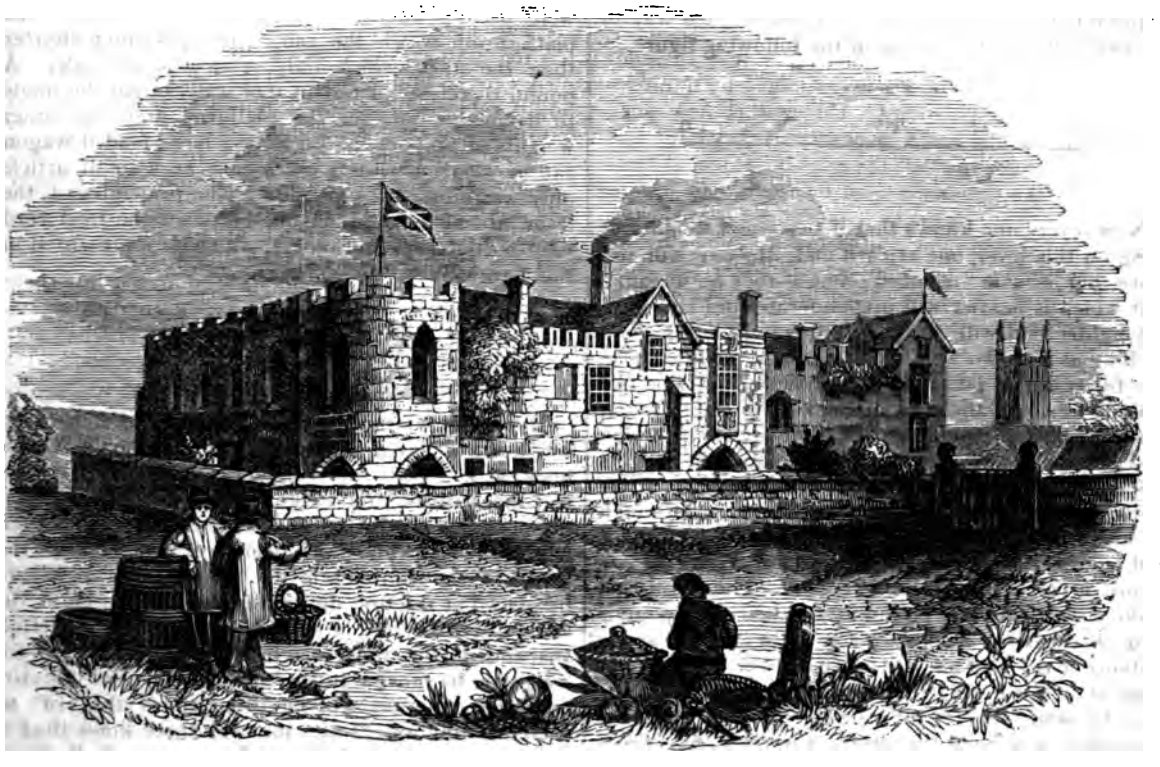
THE CASTLE AND TOWN OF TAUNTON.



TAUNTON CASTLE.

TAUNTON in Somersetshire, is 140 miles west of London, and is supposed to take its name from the river Thone, or Tone, on which it stands; but it has been spelt at different times Tantun, Tawnton, and Thonton. It is beautifully situated in a large and fertile vale, called *Taunton Dean*, which is enclosed on all sides by ridges of hills, and remarkable for the richness of its soil and the mildness of its climate. The town is not mentioned in the Roman Itineraries, but, from the immense number of Roman coins and medals found in the neighbourhood, it is thought that a Roman legion was stationed in or near it. In 1666, two large urns were dug up, full of coins of various emperors, and weighing, with their contents, about eighty pounds each; and in 1643, various Roman antiquities were discovered in the foundations of an old house, near Taunton Castle, among which was a medal of Vespasian celebrating the conquest of Judæa. There is a village near this place, called *Conquest*, which, it is supposed by some, owes its name to the conquest gained there by the Romans over the *Cangi*, or ancient inhabitants of Somersetshire; but the more general opinion is, that it is the spot where a signal victory was gained over the Danes by Alfred.

Taunton was a place of great importance in the Saxon times. It was the royal residence of some of the west Saxon kings, especially of their lawgiver, Ina, who built the first castle here, in the year 700, and held in it the great council of his kingdom. This castle was probably of wood, and having served as a royal residence and strong-hold for twenty-one years, during which time it sustained several sieges, it was pulled down, after the various seditions against Ina had been quelled, and peace restored to the kingdom. Another castle, however, was built, about the time of the Conquest, by Walkelin, bishop of Winchester, and enlarged by his successor, William Gifford. A part of this structure still remains, on the west side of the town, but the Assize-hall was built by Bishop Horne, in 1577. The building was also repaired, and the present gateway built, by Bishop Langton, in 1495. His successors sometimes resided in the castle, and the courts of the bishop of Winchester are still held there.

The access to the castle from the town is through an open court, called *Castle-green*, where, formerly, the dead were buried in the time of war. It was enclosed with gates: that on the west has been destroyed, but the gateway on the east, called the *Porter's lodge*, has been converted into a modern dwelling-house. The arches are very strong, and the grooves, in which the portcullis was let down, are quite perfect.

This edifice had fallen into such a ruinous state, in 1785, that the assizes were on the point of being removed to another place, when a sum of money was raised for the repair of the building, partly by a subscription of some of the inhabitants, but principally by the representatives of the borough. Thus the assize-hall was repaired, a new grand-jury-room built,

and the courts rendered fit for the sessions and assizes. Similar measures were again found necessary in 1816.

The Castle of Taunton was once considered the key of the west of England; and hence it was the scene of many skirmishes during the Civil Wars, in the reigns of Henry the Seventh, Charles the First, and James the Second.

The war of Henry the Seventh with Scotland afforded him a pretext for raising a subsidy of 120,000*l.* from his subjects. This proceeding caused great discontent among the inhabitants of Penryn, in Cornwall, who rose up against the authorized receiver of the tax. He retired into the castle of Taunton, whither they followed, and killed him; they then advanced as far as Wells, and were joined by a nobleman, named Lord Audley. Under this new chief, (their former leader was a blacksmith,) they advanced through Salisbury towards the neighbourhood of London, where they were defeated by the king's troops, and their leaders executed.

The Cornishmen next invited for a leader the famous Perkin Warbeck, who accordingly came from Ireland, and assumed the title of Richard the Fourth. Having gathered together an army, he attempted to storm the city of Exeter, but failed. He then came to Taunton, took its castle on the 20th of September, 1497, and caused great consternation. On the approach of danger, however, his men forsook him, and he was obliged to fly, and take sanctuary in an abbey, near Southampton, to the great joy of the inhabitants of Taunton, which was expected to be the scene of a dreadful combat, the king having advanced towards it with a large army.

This town took part in the civil wars of the latter part of the reign of Charles the First, and was so distinguished by its steady adherence to the cause of the parliament, as to gain to itself the name of "the Saguntum of the parliament;" alluding to the city of Saguntum in Spain, which was so firmly and so faithfully devoted to the cause of Rome, but was at length destroyed by Hannibal. Taunton was at that time considered a place of such strength and importance, that the parliamentary forces took care to secure it as early as possible. They therefore entered it in August, 1642, under Sir William Waller, and were assisted in their proceedings by the mayor and principal inhabitants, and the trained bands of the town and neighbourhood. Upon searching suspected houses in Taunton and the neighbouring towns, they discovered great stores of ammunition, arms, and money, which they accordingly lodged in the castle.

In the next year, however, both the town and castle were taken by the royalists, under the Marquess of Hertford, who drove out the parliament forces. In the following year it was again taken for the parliament, by Colonel Blake, in whose hands it remained till the end of the civil war. The king, however, made several vigorous efforts to recover it; as in 1644, when it was besieged, but without effect, by a royal army, of three thousand men. In the following spring, also, a body of ten thousand of the royal forces, under Lord Goring, lay before Taunton for fifty-four days, and the inhabitants were very nearly starved out, when the parliament sent to their relief a large army, commanded by Sir Thomas Fairfax. The number which actually came to the relief of the town was by no means strong enough to cope with Lord Goring's army, for the main body of Fairfax's force was sent to another part; Lord Goring, however, thinking that the whole force was approaching, fled *with his troops* in disorder, just as General Fairfax *had arrived, leaving* the inhabitants of Taunton so delighted at their deliverance, that the 11th of May, on which day it happened, was celebrated annually, for several years afterwards, with appropriate thanksgivings. During this memorable siege, a great part of the town was reduced to ashes by the shells of the besiegers, and several fine buildings were destroyed.

When Charles the Second came to the throne, the proceedings at Taunton were not forgotten; and the town underwent a severe punishment, by being stripped of its walls, which were so completely rased, that at present their site is not known. The corporation was also deprived of its charter, but this was afterwards restored.

After the death of Charles, the inhabitants of this town were zealously attached to the Duke of Monmouth, and greatly assisted him in his endeavours to dethrone James the Second. He was heartily welcomed at Taunton, where he was, for the first time, proclaimed king, and collected together the greater part of his army.

After his defeat at the battle of Sedgemoor, and his trial and execution, the inhabitants of Somersetshire and the neighbouring counties paid dearly for their disloyal conduct, for hundreds were condemned to death by the inhuman Judge Jeffreys, at what has been appropriately termed his "bloody assizes." He opened his commission in the great hall of the castle, which he ordered to be hung with red cloth, as a token of vengeance. Here, we are told, he sat, either constantly drunk, or in the most outrageous passion, uttering foul language, and showing neither pity nor mercy. He was surrounded by the detestable Kirke and his soldiers. Kirke's regiment, which is now the second foot, was then called the Tangier regiment, from having been in garrison at Tangier, in the north of Africa, which fortress had been given to Charles the Second, as a marriage-portion with his consort. This regiment was cantoned during the trial of the prisoners, on a piece of ground on the west side of Castle-green, adjoining the assize-hall, which yet bears the name of "Tangier," in memory of these transactions. The soldiers, the agents of his cruelties, were called by him his "lambs." The origin of this appellation is to be referred to the device of the Paschal lamb, which still exists on the colours of the second regiment of foot.

After the accession of William the Third, Taunton ceased to be so intimately connected, as it had previously been, with the general history of the country. At present its population is about twelve thousand, but we are told that it is still increasing. The principal manufacture is that of silk, in which about eighteen hundred hands are employed. This art was first introduced into the town in 1778, and is carried on very successfully. Formerly there was also a considerable woollen manufacture, but it has gradually declined, and at present there are scarcely any looms in the town. The woollen manufacture was introduced as early as 1336, and continued increasing till the beginning of the last century, at which time we find that 8500 persons were employed in it, the Taunton serges being then very celebrated.

The principal public building in the town of Taunton is the parish-church of St. Mary Magdalen. It is a large oblong building, divided into five aisles—a species of grandeur which, though common in the large French churches, is seldom met with in England. In this case, however, it appears that the original structure consisted of the three central aisles only, and that the two outer ones, together with the south porch, were a subsequent addition, in the year 1508, or about the time when the pointed style assumed

that excessive richness and exuoerance of ornament which immediately preceded its fall.

The most remarkable and justly-celebrated part of this church is its beautiful tower, which is attached to the west end, so that its lower part forms a vestibule to the church. This tower is commonly supposed to have been added at the same time as the outer aisles and south porch; but its style is earlier and more elegant. It is very probably a monument of the taste and munificence of the celebrated William of Wykeham*; for it bears a great resemblance to his other splendid architectural works, which are all remarkable for the chasteness of their ornament, and the elegance of their proportions, which have never been improved upon.

The only other church is that of St. James, which is very inferior to St. Mary Magdalen's in size and beauty, but resembling it in the arrangement of its parts. It has a fine ancient font, and a good organ, and likewise a tower at the west end. This was the conventual church of an ancient priory, built by William Gifford, bishop of Winchester, in 1127, and greatly enlarged by many of his successors, especially his immediate successor, Henry de Blois, brother of King Stephen. It shared the common fate, however, at the dissolution of religious houses by Henry the Eighth, and only the abbey-church was left. This church of St. James has lately been much enlarged and improved.

The Taunton and Somerset hospital owes its origin to the celebration of the Jubilee on the 25th of October, 1809, the day on which George the Third entered the fiftieth year of his reign.

There are two *endowed* alms-houses in Taunton. One was founded in 1635 by Mr. Gray, a merchant of London, who also left money to many other charities. The other was founded by Richard Huish, Esq., for the relief of thirteen infirm, but honest men, one of whom is president or reader.

Taunton still returns two members to parliament. It received a charter of incorporation in the reign of Charles the First, in 1627, which charter it lost a second time, in the year 1792. The efforts of the inhabitants to revive the corporation, during the regency of George the Fourth, were not attended with success.

* See *Saturday Magazine*, Vol. IV., p. 115.

We look with wonder at the transformations that take place in insects, and yet their physical metamorphoses are not greater than the changes which we ourselves undergo, morally and intellectually, both in our relations to others and in our individual nature.—*The Doctor.*

The admirable harmony established by the Creator between the various constituent parts of the animal frame, renders it impossible to pay regard to or infringe the conditions required for the health of any one, without all the rest participating in the benefit or injury. Thus, while cheerful exercise in the open air, and in the society of equals, is directly and eminently conducive to the well-being of the muscular system, the advantage does not stop there; the beneficent Creator having kindly so ordered it, that the same exercise shall be scarcely less advantageous to the proper performance of the important function of respiration. Active exercise calls the lungs into play, favours their expansion, promotes the circulation of the blood through their substance, and leads to their complete and healthy developement. The same end is greatly facilitated by that free and vigorous exercise of the voice, which so uniformly accompanies and enlivens the sports of the young, and which doubles the benefits derived from them considered as exercise. The excitement of the social and moral feelings among children engaged in play is another powerful tonic, the influence of which on the general health ought not to be overlooked; for the nervous influence is as indispensable to the right performance of respiration, as it is to the action of the muscles or to the digestion of food.—Combe.

A FRAGMENT ON BEARDS.

There was a poor fellow among John Wesley's followers, who suffered no razor to approach his chin, and thought it impossible that any one could be saved who did: shaving was in his opinion a sin for which there could be no redemption. If it had been convenient for their interests to put him out of the way, his next of kin would have had no difficulty in obtaining a *lettre de cachet* against him from a mad doctor, and he might have been imprisoned for life, for this harmless madness. This person came one day to Mr. Wesley, after sermon, and said to him in a manner which manifested great concern, "Sir, you can have no place in heaven without a beard! therefore, I entreat you, let yours grow immediately!"

Had he put the matter to Wesley as a case of conscience, and asked that great economist of time how he could allow himself every day of his life to bestow nine precious minutes upon the needless operation of shaving, the patriarch of the Methodists might have been struck by the appeal, but he would soon have perceived that it could not be supported by any just reasoning.

For in the first place, in a life of such incessant activity as his, the time which Wesley employed in shaving himself was so much time for reflection. However busy he might be, as he always was,—however hurried he might be on that particular day, here was a portion of time, small indeed, but still a distinct and apprehensible portion, in which he could call his thoughts to council. He was a person who knew this, and he profited by it, as well knowing what such minutes of reflection are worth. For although thought cometh like the wind, when it listeth, yet it listeth to come at regular appointed times, when the mind is in a state of preparation for it, and the mind will be brought into that state, unconsciously, by habit. We may be as ready for meditation at a certain hour, as we are for dinner, or for sleep; and there will be just as little need for an effort of volition on our part.

Secondly, Mr. Wesley would have considered that if beards were to be worn, some care, and consequently some time, must be bestowed upon them. The beard must be trimmed occasionally, if you would not have it as ragged as an old Jew clothes-man's: it must also be kept clean, if you would not have it inhabited like the emperor Julian's; and if you desired to have it like Aaron's, you would oil it. Therefore it is probable that a Zebedeean, who is cleanly in his habits, would not save any time by letting his beard grow.

But it is certain that the practice of shaving must save time for fashionable men, though it must be admitted that these are persons whose time is not worth saving, who are not likely to make any better use of it, and who are always glad when any plea can be invented for throwing away a portion of what hangs so heavily upon their hands.

> Alas, Sir, what is a Gentleman's time!
> ——— there are some brains
> Can never loose their time, whate'er they do.

For in former times as much pains were bestowed on dressing the beard, as in latter ones upon dressing the hair. Sometimes it was braided with threads of gold. It was dyed to all colours, according to the mode, and cut to all shapes, as you may learn from John Taylor's *Superbiæ Flagellum.*

> Now a few lines to paper I will put,
> Of men's beards strange and variable cut:
> In which there's some do take as vain a pride,
> As almost in all other things beside.
> Some are reaped most substantial like a brush,
> Which make a natural wit known by the bush:

(And in my time, of some men I have heard,
Whose wisdom hath been only wealth and beard.)
Many of these the proverb well doth fit,
Which says Bush natural, more hair than wit.
Some seem as they were starched stiff and fine,
Like to the bristles of some angry swine:
And some (to set their love's desire on edge)
Are cut and pruned like to a quickset hedge.
Some like a spade, some like a fork, some square,
Some round, some mowed like stubble, some stark bare,
Some sharp stiletto fashion, dagger like,
That may with whispering a man's eyes out pike;
Some with the hammer cut, or Roman T,
Their beards extravagant reformed must be;
Some with the quadrate, some triangle fashion,
Some circular, some oval in translation,
Some perpendicular in longitude,
Some like a thicket for their crassitude,
That heights, depths, breadths, triform, square, oval, round,
And rules geometrical in beards are found;
Beside the upper lip's strange variation,
Corrected from mutation to mutation;
As't were from tithing unto tithing sent,
Pride gives to *Pride* continual punishment.
Some (*spite their teeth*) like thatched eaves downward grows,
And some grow upwards in despite their nose.
Some their mustachios of such length do keep,
That very well they may a manger sweep!
Which in Beer, Ale, or Wine, they drinking plunge,
And suck the liquor up as 't were a sponge;
But 'tis a sloven's beastly *Pride* I think
To wash his beard when other men must drink.
And some (because they will not rob the cup)
Their upper chaps like pot hooks are turned up,
The Barbers thus (like Tailors) still must be,
Acquainted with each cut's variety.

In comparison with such fashions, clean shaving is clear gain of time.—*The Doctor.*

WHILE upon the Bonin islands, searching for shells on the rocks, I was much astonished at seeing at my feet a most extraordinary-looking animal, crawling towards the surf, which had only just left it. I had never seen one like it under such circumstances before. It was creeping on its eight legs, which from their soft and flexible nature, bent considerably under the weight of its body, so that it was lifted by the efforts of its tentacula only a small distance from the rocks. It appeared much alarmed at seeing me, and made every effort to escape, while I was not much in the humour to endeavour to capture so ugly a customer, whose appearance excited a feeling of disgust, not unmixed with fear. I however, endeavoured to prevent its career, by pressing one of its legs with my foot; but although I made use of considerable force for that purpose, its strength was so great that it several times quickly liberated its member, in spite of all the efforts I could employ in this way on wet, slippery rocks. I now laid hold of one of the tentacles with my hand, and held it firmly, so that the limb appeared as if it would be torn asunder by our united strength. I soon gave it a powerful jerk, wishing to disengage it from the rocks to which it clung so forcibly by its suckers, which it effectually resisted; but the moment after, the apparently enraged animal lifted its head with its large eyes projecting from the middle of its body, and letting go its hold of the rocks, suddenly sprang upon my arm, which I had previously bared to my shoulder, for the purpose of thrusting it into holes in the rocks to discover shells, and clung with its suckers to it with great power, endeavouring to get its beak, which I could now see, in a position to bite!

A sensation of horror pervaded my whole frame when I found this monstrous animal had affixed itself so firmly upon my arm. Its cold slimy grasp was extremely sickening; and I immediately called aloud to the captain, who was also searching for shells at some distance, to come and release me from my disgusting assailant. He quickly arrived, and taking me down to the boat, during which time I was employed in keeping the beak away from my hand, quickly released me by destroying my tormentor with the boat-knife, when I disengaged it by portions at a time. This animal must have measured across its expanded arms about four feet, while its body was not larger than a large clenched hand. It was that species of sepia* which is called by whalers *rock-squid.*—BEALE.

* *See Saturday Magazine*, Vol. XV., p. 11.

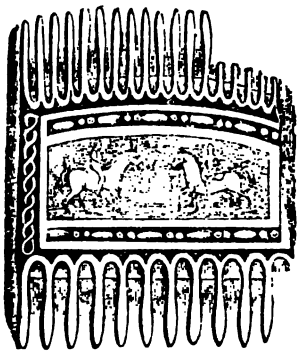
MATERIALS FOR THE TOILETTE.

No. V.

ON COMBS.

ANGLO-SAXON LADY DRESSING HER HAIR.

THE *Comb* appears to have been used by ladies, as a decoration for the hair, from a very early period; although it seems probable that at many intervening periods the influence of fashion has tended to bring it into disuse. Some of the Greek tombs which have been opened, have been found to contain, among other implements, combs made of box-wood. Montfaucon gives a representation of an ancient comb by no means deficient in elegance. It is apparently of box-wood or ivory; very broad, but short; with long teeth, those on one side being larger than those on the other; and the solid middle was studded or carved with bas-reliefs. In a work written by Guasco, on ornaments, are several representations of ancient Roman combs; one in particular, which was in the Museum Lettala, at Milan, was a long one of box, of which the handle was overlaid with ivory, and appears to have been ornamented with a small meander or filigree in gold: it had two rows of fine teeth, delicately wrought and well proportioned.



ROMAN COMB.

Some of the ancient Britons were found to possess combs; we have copied, at the head of this paper, an old representation of an Anglo-Saxon lady, with a looking-glass in one hand, and a comb in the other, in which the comb is seen to have a double row of teeth. The early Germans are said to have had combs made of "horse tail:" we presume this must mean the stiff horse-hairs. Combs of the thirteenth century have been found, set with jewels; and in a more humble form, combs have been met with formed of the teeth of fish, set in bone.

The comb-makers of Paris were at one period a body of some consideration in a manufacturing point of view. They formed a company which had laws and bye-laws so early as the year 1507. Henry the

Third confirmed the privileges of the company by letters patent in 1578; and Henri Quatre did the same in 1600. Louis the Fourteenth, in 1691, confirmed them, adding at the same time some new clauses respecting the rights of apprentices, &c.

Combs are, as is well known, made of various substances, of which, however, the principal are *tortoiseshell* and *horn*. We will therefore give a brief account of these substances, and of the mode of preparing them.

Tortoiseshell is the scale or covering of the testaceous animal called a tortoise. The whole covering is not properly shell, for it is, through the greater part of its thickness, of a perfect bony contexture; and it is only on the outside that it is covered with scales, or rather plates, of a horny substance, which is what the workmen call tortoiseshell.

There are different species of the tortoise; but it is only that one called the *testudo imbrecata*, which yields shell fit for ornamental uses. The lamellæ, or plates of the shell of this species, are stronger, thicker, and clearer, than those of any other kind, and constitute the sole value of the animal. They are semi-transparent, and elegantly variegated with whitish, yellowish, reddish, and dark-brown clouds and undulations, so as to constitute, when properly prepared and polished, one of the most elegant articles for ornamental purposes. These lamellæ form the external coating, and this is raised or separated from the bony part, which it covers, by placing fire beneath the shell; the heat soon causing the plate to start, so as to be easily detached from the bone. These plates vary in thickness, according to the age and size of the animal, and measure from an eighth to a quarter of an inch in thickness. A large turtle is said to afford about eight pounds of tortoiseshell; or, according to M. Schoepf, from five to fifteen pounds; and unless the animal itself be about the weight of 150 pounds, the shell is not worth much.

In order to bring tortoiseshell into the particular form required on the part of the artist, (says Dr. Shaw in his *General Zoology*,) it is steeped in boiling water, till it has acquired a proper degree of softness, and immediately afterwards committed to the pressure of a strong metallic mould of the figure required; and where it is necessary that pieces should be joined so as to compose a surface of considerable extent, the edges of the respective pieces are first scraped or thinned, and being laid over each other during their heated state, are committed to a strong press, by which means they are effectually joined or agglutinated.

The common *horn* combs are made from the substance of the horn of the bullock. The bullock's horns are prepared for being manufactured into combs by the tips being sawn off, after which they are held in the flame of a wood fire, till they become nearly as soft as leather. In this state they are split open on one side, and pressed in a machine between two iron plates, then plunged into a trough of water, whence they come out hard and flat. When the horn is cut to the size intended for the required combs, several pieces are laid upon a pair of tongs, adapted to the business, over a fire made chiefly of joiner's shavings, to soften them. They are frequently turned, and when sufficiently soft, are put into a vice and screwed tight, to complete the flattening. When this process is finished, the horns are perfectly flat and hard; they are then given to a man who shaves, planes, or scrapes off the rough parts with a knife, similar in shape to one used by coopers, having two handles, which the comb-maker works from him, across the grain of the horn, from one end of the intended comb to the other. When both sides are perfectly smooth, it is delivered to the person who cuts the teeth.

Ivory is frequently used as a material for combs. That species which is imported from Ceylon is preferred, as being less liable to turn yellow by exposure to the atmosphere. The whiteness which ivory acquires, depends chiefly on the degree of dryness which it has attained. When yellow, its gelatinous matter is altered by the air, and appears combined with the oxygen of the atmosphere. Heat is insufficient for making ivory pliant, though it is rendered softer by being exposed to heat. The ivory is cut into thin slices by means of a saw; and for very delicate work the operation is sometimes performed under water, to prevent the ivory from being heated or rent by the action of the tool. It is polished with pummice-stone and tripoli.

These, then, are the modes in which the principal substances, of which combs are made, are prepared for the operation of cutting the teeth in them. This process we need not here describe: by referring to the *Saturday Magazine*, vol. xiii., p. 224, the reader will find details sufficiently minute for the comprehension of the subject. But those details relate merely to the operation of cutting the teeth, and do not speak of the general form given to the comb. These forms are often exceedingly elegant, the comb being curved in a graceful manner. Its surface also is often embossed with figures in relief, not only formed of ornaments of pearl, &c., affixed to the comb, but the substance of the comb itself is raised in ornamental relief. This is in most cases effected by pressure combined with heat, and merits a short notice from us.

In order to press horn or tortoiseshell into any given form, it is first placed in hot water until it becomes sufficiently softened. It is then put into moulds of iron or brass, made in two or more pieces, and with cavities between them to correspond with the article which is to be fabricated, and with all its intended ornaments engraved in the interior surface of the mould. This mould being made hot, the horn or shell is put between its two halves, and the mould being put in a small screw-press, the halves are forced together, to imprint the horn, and press it into the cavity of the mould. But if the article has any considerable relief, this cannot be done at one heating, and therefore the press, with the moulds in it, is put into a copper and boiled still longer; it is then taken out, and by a lever applied to the screw, it is screwed tighter, so as at length to obtain the impression desired. This description applies to a large variety of articles manufactured in horn or tortoiseshell.

The costliness of tortoiseshell has led to many different attempts to stain common horn so as to imitate the variegated appearance of tortoiseshell. One of the methods of obtaining this effect is thus described:—the horn to be dyed, being first pressed into a flat form, is to be spread over with a kind of paste made of two parts of quicklime and one of litharge, brought into a proper degree of consistency with soap ley. This paste must be put over all the parts of the horn, except such as are intended to be left transparent, to give it a nearer resemblance to tortoiseshell; the horn must remain in this state till the paste be quite dry, when it is to be rubbed off. It requires a considerable share of taste and judgment to dispose the paste in such a manner as to form a variety of transparent parts, of different magnitudes and figures, to look like nature. Some parts are, by a neat process, rendered semi-transparent, which is effected by mixing whiting with a part of the paste, to weaken its operation in particular places; by this means spots of a reddish-brown will be produced, so as greatly to increase the beauty of the

work. Horn, thus dyed, is manufactured into combs, and frequently sold for real tortoiseshell.

Many other modes of dyeing horn to resemble tortoiseshell have been described, but we do not deem it necessary to dwell upon them here.

Within a few years, *iron* has added to the number of its useful applications, by being employed as a material for combs. Small cheap combs are made of this metal, and then japanned or blackened by a subsequent process.

PROPAGATION OF PLANTS BY CUTTINGS IN WATER.

THE art of propagating plants by cuttings embraces a vast number of very interesting facts. The method to which we now solicit the attention of our amateur readers is despised by the professional gardener, as being beneath his skill and attention: nevertheless it will not be difficult to show that the instruction which it conveys, is in itself amply sufficient to rescue it from contempt, or rather to raise it high in the estimation of the lover of nature.

The three spring months comprise the period wherein cuttings succeed most freely; and for the reason, that they are then inclined to start into growth, and to obey the increasing stimulus of solar light; but they are not inactive during the summer, and many cuttings of the hard-wooded species prosper most, when they are placed in a cool situation, late in autumn. They thus retain their vital power during winter, gradually form a callus, or granulated mass, between the bark and wood, and finally develope roots, when gently excited by heat, in the early spring.

A cutting is prepared by passing a knife either through or close under a joint or leaf; and it almost invariably is found that, if a young shoot be slipped off the parent plant, and carefully trimmed at the heel, to remove asperities, and render the surface smooth, roots will be produced much more freely than they would be from any intermediate part; for a number of minute embryo buds exist round the base of a shoot or twig, just at the point of its junction with a larger branch. These buds or germs seem peculiarly inclined to protrude root processes, while those seated among the leaves of the upper part tend directly to expand into shoots. But when a cutting is fixed in the soil, whether it be in a pot or in the open ground, its progress is concealed, and can be only conjectured by the appearance of the part which remains above the surface. This forms one objection; another is found in the trouble which attends the plunging in heat, the covering with a hand or bell-glass, and the necessity of guarding against mouldiness or damping off, by frequently removing and wiping that glass. A cutting, when placed in a phial of water, may fail; it may also decay; but, if it is to succeed eventually, two circumstances will become obvious—first, it will not flag or droop, though no glass covering be put on it; and second, the water, however long the cutting remain over it, will show little, if any, tendency to become fetid and offensive. Every one must have remarked the extreme fetor acquired by water in which flowers are placed; therefore the contrast exhibited by the fluid in which a vegetating and growing plant remains during several weeks, exposed perhaps to the occasional heat of 95-100 degrees, is equally extraordinary and pleasing: there may be found exceptions; but they have not come under our notice, and we have had not a little experience for more than seven *years.*

It has long been an observed fact that the oleander (Nerium) will emit roots, if a young green shoot of it be placed in a small bottle of water, exposed to either the sun-heat of a window, or to the warm atmosphere of a hot-bed frame, or forcing-house. It frequently happens that a lively shoot, with the flower-buds becoming visible at its summit, will take root in a few weeks, and being then transferred to a pot of suitable earth, in heat, will retain and expand its flowers, forming a beautiful object in miniature.

The succulents root freely; so does the balsam. Of the last-named plant, specimens not eight inches high have been produced in a few weeks, with several expanded flowers, although the parent plant did not exhibit the slightest signs of coming into bloom. Small cuttings of the cucumber and melon, taken at the third joint from the summits, or indeed from any part of the plants, rarely fail to root in a few days; and we entertain little doubt that a stock of succession plants for the frames can thus be obtained more readily than by any ordinary process. Even single leaves protrude a mass of fibres, though it has not appeared that any latent bud became excited to form a shoot.

Among multitudes of examples we may cite the salvias—ruellia formosa, all the justicias which were subjected to trial, heliotropi, aloysia citriodora, alonsoa, petrenia, Thunbergiasturnera, as generally free-rooters. Dahlia is arbitrary, and so is crythrina christa-galli, or taurifolia; but they succeed after depositing masses of a species of parenchymatous matter. The Gesnereacea, particularly glexinia speciosa and candida, rarely fail. The careful observer will perceive in the two last a gradual convexity to form at the base of the cutting: it is the origin of the future tuberous mass, and, and from it small glittering fibres emerge, which appear like glass threads. Nothing can exceed the interest possessed by this charming object.

Among shrubs we have tried successfully gardenia, melastonia, pelargonium, the dark China rose, begonias Sutherlandia, coronilla, &c.

Not to dwell upon the instruction to be derived from the observation of processes which stand revealed to the eye, we do contend that as, in removing these rooted subjects from their fluid element, no injury is done to the slightest fibre or most delicate spongeole, a great object is attained; for the plants, if treated with any degree of skill and dexterity, strike off at once, and establish themselves in an appropriate soil with the least possible loss of time.

[From the *Morning Herald.*]

FLOWERS of plants removed from a hotter to a colder climate, disclose their flowers at a later hour. Thus, that which flowers in Senegal at six, will not unfold in France or England till eight or nine, and in Sweden, not till ten; and the flower that does not open in Africa till noon, or later, will not open in England at all.

TIME flies on in the same rapid course, and while we still trifle, Eternity is upon us. A gracious Providence calls upon us by the loudest alarms to hasten and finish our appointed work—and we carelessly devote our attention to objects undeserving the serious contemplation of a monkey. I do not call it trifling to enliven the circle of social good humour—to improve all our talents, small as well as great, to the praise of the giver,—thankfully to enjoy and admire even his least and most common bounties &c., but I have no patience with the false politeness of the world that banishes every subject that is interesting and delightful, if it bear but the name of seriousness.—TALBOT.

Of all the duties, the love of truth, with faith and constancy in it, ranks first and highest. Truth is God. To love God and to love truth are one and the same.—SILVIO PELLICO.

MECHANICAL POWERS.

No. II.

The Lever (*Continued.*)

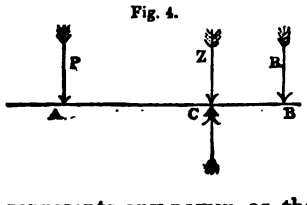
But, when the lever is used as a mechanical power, it is not always used merely to lift or balance weights. Instead of applying two weights to different parts of the lever, we apply a certain power to one part, in order to overcome a certain resistance which acts on another part. The power may be either that of a man or animal; or that of gravity acting on a weight, as in a clock; or the elasticity of a spring, as in a watch; or the force of the wind, or of a current of water, or the elasticity of steam. All such producers of power are called *prime movers*.

The resistance to be overcome may be the power of gravity, as when we want to lift a very heavy body; or that of inertia, or of friction, as when we wish to move a large body, which has naturally a tendency to remain at rest, called inertia, and whose motion is rendered difficult by its *friction*, or rubbing against the ground, or other body which supports it, as well as by the resistance of the medium through which it moves, as is the case with an oar, or wing, or paddle. At other times the resistance is that of cohesion, as when we want to cut, break, or grind a substance; in doing which we overcome the force with which the particles *cohere*, or hold together.

In all these cases, the power and resistance may be considered as two weights, and may be made to balance each other; or either may be made to preponderate, according to their distance from the centre of motion.

Of course the object always is, to make the power overcome the resistance; and, if the power be naturally stronger than the resistance, there will be no difficulty in effecting this. But if not, the power must be applied at a greater distance from the fulcrum, so as to move with greater rapidity, thereby possessing greater momentum or impulse. In the following figure A B represents a lever suspended from Z, or resting on its fulcrum at C. It is obviously of no importance whether it simply rests on a fixed point at C, or whether it is hung up at Z, or moves on a hinge or axis, as in fig. 2. P represents any power, as that of the hand, pushing the end A of the lever down; and R is the resistance to be overcome, or the weight to be lifted at B. Now it will always be found, that if the arm A C be longer than C B, a small power will be enabled to overcome a greater resistance; but if C B be the longer arm, the power will require to be much greater than the resistance, in order to balance or overcome it. In this figure, as the distance A C is twice as great as C B, any resistance at R will be balanced by half as much power at P; because the point A must move through a space twice as great as the point B does in the same time; so that it has twice the velocity, and consequently, although it is naturally a weaker power, yet its increased velocity gives it as great a momentum, or effective impulse, as the stronger power at R. If it were required to lift a weight of 1000 pounds at R, we need only press with a power of 500 pounds at P, in order to balance the 1000 pounds; and any power greater than 500 pounds would of course lift the 1000 pounds.

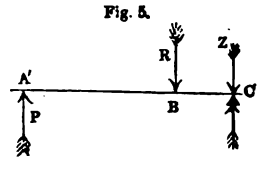
Fig. 4.



But nothing is actually gained by the lever; for ***whatever is gained in power is lost in velocity***; and ***whatever is gained in velocity is lost in power***:—a rule which applies not only to the lever, but to all the mechanical powers; and consequently to all combinations of them, that is, to all machinery. Thus, in the above instance, in order to move the 1000 pounds at R through one inch, or one foot, or one yard, as the case may be, we must move the 500 pounds at P through two inches, or two feet, or two yards. If we made the part A C sufficiently long, and the part C B sufficiently short, it would be very easy to overcome a resistance of 1,000,000 pounds by a power of only one ounce; but then in order to lift the 1,000,000 pounds one inch, the ounce must move through 16,000,000 inches. This consideration holds good in all machines that man can invent; and probably incited the celebrated Archimedes to aver, that he could move the earth from its place, if he could find a fulcrum for his lever: by which he intimated that the principle of the lever was of larger application than man was able to avail himself of.

But this is not the only manner in which the lever is used. There are two other modes of employing it. In the second kind of lever, the fulcrum is placed at one end, the power acts at the other end, and the resistance to be overcome acts at a point between them, as in the following figure, where P is the power, acting at A′, R the resistance, acting at B, and C the fulcrum. It will be observed that here, the power and resistance act in opposite directions, one tending to push the lever up and the other down; but as the power at A is furthest from the fulcrum C, suspended from Z, it describes a larger arc than the point B, and therefore this velocity at A′ makes the power P more effective. Hence velocity is diminished at B, but power is gained. In the first kind of lever power might be either gained or lost, according as the arm A C was longer or shorter than C B; but in the second kind there can never be a loss of power, because the distance A C must necessarily exceed B C, which is only a part of A C. In the figure, B C is only one-third of A C; and therefore the power P need be only one-third of the resistance R to be overcome. If the resistance R were applied at a point nearer to C, the gain of power at P would of course be greater. Thus if we try to raise one end of a form on which a person is sitting, we shall always find it easier if we apply our strength at the end furthest from that on which he is seated, than at the other end; because we then use the form as a lever of the second kind.

Fig. 5.

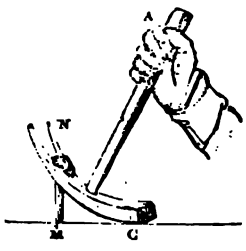


Whenever we wish to overcome a great resistance, we instinctively use a lever, either of the first or second kind, and nearly all the tools and instruments in daily use are of one of these sorts. In stirring a fire, the poker is a lever of the first kind; its fulcrum is the bar of the grate on which it rests; and the resistance to be overcome is the gravity or the compactness of the coals. In digging, after the spade has been thrust into the ground, it is generally used as a lever of the first kind, to lift and disturb the mass of earth in front of it; and accordingly this is more easily done when the spade is handled at the top than at any lower part; for the fulcrum is the earth behind the lower end of the spade.

A lever need not necessarily be straight. For instance, when a nail is drawn by a clawed hammer, (as in fig. 6,) the hammer is a bent lever of the first kind, the fulcrum being at C, and the resistance being the adhesion of the nail N M to the wood, and acting at M. Accordingly, the nail will be drawn with

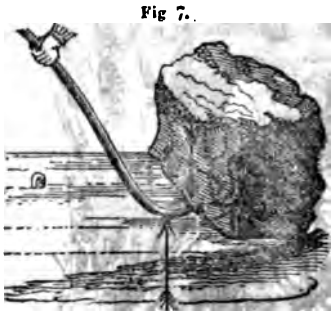
greater ease by applying the power of the hand at A, than at any lower point; for the power gained is in proportion as the distance A C exceeds M C.

Fig. 6.



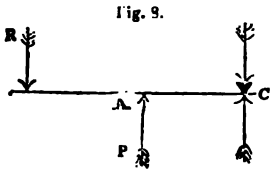
Whenever we raise or move one end of a body, the other end of which remains fixed, we use that body as a lever of the second kind; the resistance being the weight of the body itself. Thus every door and window-shutter is a lever of the second kind, the fulcrum being at the hinge; and of course the further from the hinge we apply our strength, the more easily will the door or shutter be shut or opened. A crow-bar is sometimes used as a lever of the first, and sometimes of the second kind. Sometimes it is rested on a small piece of wood or stone, as in the following figure, where the point of the arrow presents the fulcrum, the power is the hand, and the resistance the weight of the stone; which will of course be moved more easily in proportion as the hand is applied further up the crow-bar. In the other mode of using the crow-bar, it is slipped a little way under the weight to be moved, and the ground on which the lower end rests, serves as a fulcrum. The power is applied at the upper end, and the resistance acts at a point between them; and accordingly, it is found more easy to lift the weight of the stone, when the crow-bar is only slipped a little way under the stone, than when it passes further under.

Fig 7.



The third kind of lever is that in which the fulcrum is at one end, as in the second kind; but the resistance acts at a point further off than the power, instead of being nearer. In the following figure, C is the fulcrum, P the power, acting at B, and R the resistance, acting against it at A. Here it is evident that there is a gain of velocity, but a loss of power at A; for the power has to move the resistance through a larger space than it describes itself; and whenever this is the case power is lost. Nevertheless, this mechanical power often operates in machinery, when the velocity has to be increased; and sometimes it is unavoidably used, as in lifting a ladder to or from a wall, which requires considerable strength, because that strength is used with so great a loss; for the ground is the fulcrum, the weight to be moved is the ladder itself, and the power of a man's arms is made to act at a point not more than five or six feet from the fulcrum, while the chief part of the ladder's weight lies considerably higher up. For the same reason, it is rather difficult to shut a door by applying your strength close to the hinge; for then you use the door as a lever of the third kind: but by applying your strength at the handle you make it a lever of the second kind; *for the chief* part of its weight lies between you and *the hinge or fulcrum.*

Fig. 9.



When the object of an instrument is to cut, break, or bruise substances, two levers are used which move on a common fulcrum, called a *joint.* The substance to be cut or crushed is placed between them, and the power is made to act at a point further from the fulcrum. A little reflection will soon satisfy the reader that scissors, shears, pincers, and snuffers, are double levers of the first kind, having the fulcrum between the power and the resistance; and therefore when used to cut very hard substances, they should have the handles much longer than the points. But nut-crackers are double levers of the second kind, in which the resistance is placed between the power and the fulcrum; and therefore the nut will be cracked more easily in proportion as it is placed nearer to the joint. Tongs, tweezers, and shears used in sheep-shearing, are double levers of the third kind; and it will be observed that such instruments are never used when there is much resistance to be overcome.

IT was an excellent practice in Sparta to accustom their youth betimes to suffer heat and cold, hunger and thirst, and by several severe and laborious exercises to bring the body into subjection to reason, whose faithful and diligent minister it ought to be in the execution of all the orders and injunctions of reason, which it can never do, if unable to undergo hardships and fatigue.

WE often use a *mental magnifying glass* to objects that are small and frivolous, and turn the wrong (or diminishing) end of the glass to those that are really great and important; this is the case of all worldly minded persons.

THE Greeks despised and abjured the servile ceremonial of the Persian court, preferring to it the incessant turbulence of their own democracies; and the Romans held in a kind of superstitious abhorrence the title of king, even after they had bowed their necks with complacency to despotic power under the military title of Emperor. These popular fallacies of antiquity had not been detected and exposed, while they seemed to produce no bad effect; and the surface of ancient history had not then been penetrated by inquirers, who investigated the state of human society concealed under it. When ancient republics became sufficiently established to ensure the safe custody of the captive by walls and fetters, slavery came into use instead of indiscriminate slaughter of the vanquished enemy; and slaves, predial or domestic, soon constituted the majority of mankind. Thus the high-spirited patriots of antiquity, whom we assume as models of noble conduct, were all slave-holders, nationally or individually; and their patriotism, when closely examined, is found to be little else than an effort to obtain similar command over their equals by violence or treachery. So incessant were those attempts, that it is incidentally said, in the time of Alexander the Great, after he had humbled and pacified the Greek republics, that he restored to their homes 10,000 political exiles; many of whom, no doubt, had been whetting the dagger by which they hoped to be restored to their native cities, supported by domestic faction or foreign aid. Such were the strenuous patriots of classic Greece, such the hideous state of society infested by their cruelty and violence. Yet, such was the mighty influence of education, that at the commencement of the French revolution resistance against any settled government was deemed laudable, because, forsooth, government did not form an exception to all other human arrangements, by having attained to absolute perfection; and the experiment of bestowing power without responsibility, (the essence of all democracies), aggravated by its limited tenure, was tried in civilized France; with a result which suffered by comparison with the atrocity of ancient proscriptions, and dispelled the illusion of the ardent spirits of the age.—*Life of Thomas Telford.*

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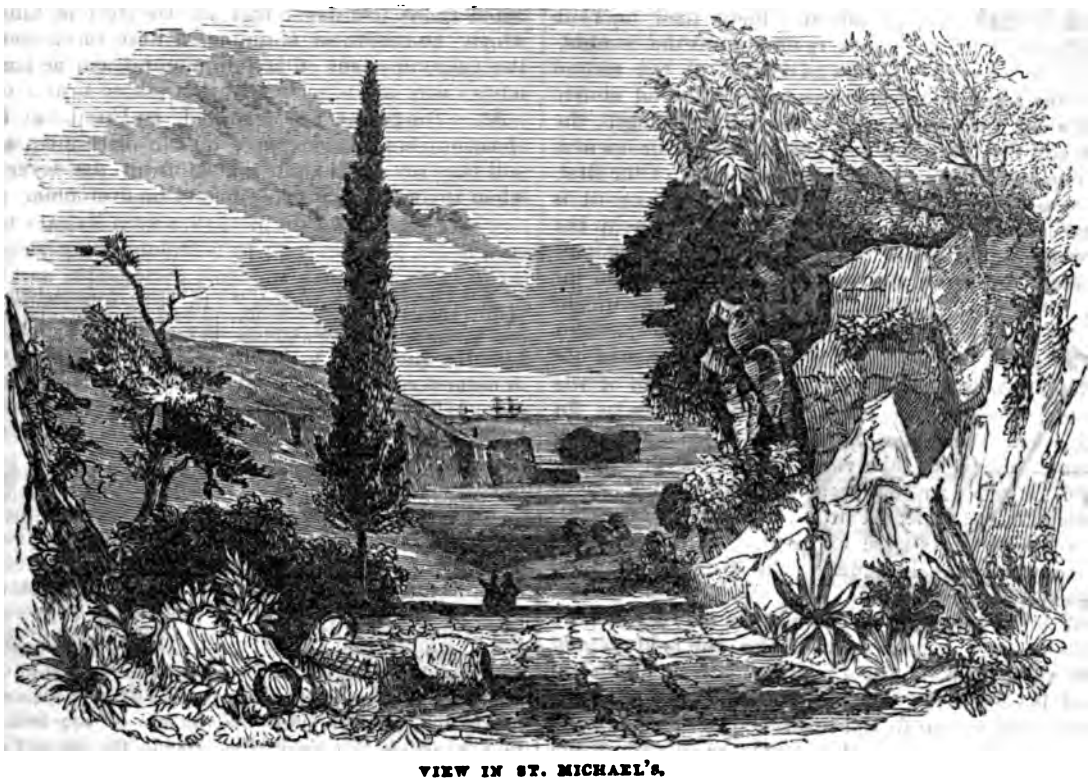
THE AZORES, OR WESTERN ISLES.



VIEW IN ST. MICHAEL'S.

No. I.
ST. MICHAEL'S.

Bear me Pomona! to thy citron groves;
To where the lemon and the piercing lime,
With the deep orange glowing through the green
Their lighter glories blend.—Thomson.

[D the reader, while enjoying one of nature's most licious fruits, the orange, ever carry his thoughts those beautiful islands, where "the orange flower rfumes the bower," and desire to know something the locality, the growth, and natural properties of e wholesome production which is so abundantly pplied to him? "Fine St. Michael oranges," is the y which, during the orange season so frequently eets the ears of the passenger in the streets of ndon. Our fruit-shops, fruit-stalls, and hawkers, e so abundantly supplied with this golden produc- n of nature, that we should suppose almost every e who loves an orange (and who does not?) is either ll acquainted with, or would wish to receive, the formation we are now about to supply.

But it happens in this, as in many other cases, that object which is brought so constantly before us ses to interest us; while that which is new and range excites our liveliest curiosity. "Where is . Michael's, mama, where the oranges come from?" id a little girl to her mother. "In Cornwall, my ar; they grow upon St. Michael's Mount!" was e answer. In fact, so little has been written about e islands among which that of St. Michael is situated, that more persons than one are likely to mistake St. Michael's, in Cornwall, for the island of the same name in the North Atlantic Ocean.

The Azores, or Western isles, are situated in the Atlantic about eight hundred miles to the west of Portugal, to which country they belong. They form three groups, of which the central is the most important, and consists of five islands, namely, Terceira, St. George, Pico, Fayal, and Graciosa. These islands are sometimes called the Terceiras. About a hundred miles to the north-west lie the small islands of Flores and Corvo: and about sixty miles E.S.E. from the Terceira group are the islands of St. Michael and St. Mary.

All these nine islands are included in the general term Azores, or the *Western isles*, as the English usually term them. They were first visited by the Arabian navigators, and described by their geographers, as may be seen in the manuscript charts of the fourteenth century; but they seem to have been rediscovered by a navigator of Bruges named Vanderberg, about the year 1431. He was sailing for Lisbon, and being driven far west by a storm, noticed these islands; and having afterwards arrived in the Tagus and mentioned his accidental discovery, the Portuguese, at that time an active and enterprising people, sent off Gonsalvo Velho Cabral on a voyage of discovery. In the following year Cabral discovered the island of St. Mary, which he so named, and in the course of time the other islands of this Archipelago were discovered.

The island of St. Michael's was discovered in May 1444, by a prisoner in St. Mary's, who, having broken loose, fled to the mountains, and while there observed, one fine evening at sun-set, the high peaks of this island rising like pyramids out of the sea, to the north-west. In hopes of pardon he returned home, and made this discovery to Cabral, who forgave him, and immediately set out on another voyage of discovery. All these islands, when first visited, were found to be entirely uninhabited by man or any animals, except birds, which were very numerous, especially the *hawk*, or falcon tribe, called Açor in Portuguese, whence comes the name of the islands, *Açores*, or AZORES, the hawk islands.

A small colony of Portuguese was settled at St. Mary's by Cabral, shortly after its discovery. In 1443 and the following year, some African slaves and Portuguese settlers prepared to colonize St. Michael's. The other groups were gradually peopled. In 1446 the Azores were given by Alfonso the Fifth to his sister the Duchess of Burgundy and Regent of Flanders, when many Flemish settlers helped to people the island; and their descendants are still to be found therein. This circumstance caused the term Azores to be exchanged for a time for that of *Os Flamengos*, or the *Flemish Isles*. On the death of the duchess, however, they reverted to Portugal. In 1580, when Philip the Second of Spain seized the throne of Portugal then vacant, he took possession of the Azores. In 1640, when the present dynasty of Braganza was elected to the throne of Portugal, and the Spaniards were expelled, the Azores again reverted to Portugal, under whose government they have ever since remained.

The governor, who is captain-general of the nine islands, resides at Angra in Terceira; he is appointed every three years: but the administration of each island is under the control of one or two captain-majors, who attend to the maintenance of the police, command the militia, and inspect the receipt of the taxes. The two forts of Angra have separate commandants; but the islands are, upon the whole, in a bad state of defence. The bishop resides at St. Michael's.

The Azores, geologically considered, seem to be of comparatively recent sub-marine volcanic formation, symptoms of which are everywhere apparent by the actual condition of the surface, which bears constant marks of being formed by the violent and terrific agency of fire.

By these tremendous means, (says Captain Boid,) all the islands have been at various unknown periods forced up from the sea. From this general rule, however, may be excepted that of Santa Maria,—which, although it has, like the rest of the Azores, been forced above the level of the sea by volcanic action, nowhere bears traces of the effects of fire on its surface.

The effects of these awfully sublime movements of nature give rise to appearances, on the face of a country, of the most peculiar kind; and nothing can be more interesting than the characteristics of these islands. Their general aspect is picturesque and bold. They, for the most part, present an irregular succession of isolated conical, or cacuminated, hills, with table-lands rising from two to five thousand feet in height; the former being separated by valleys, the latter stratified and intersected with tremendous ravines and deep chasms formed by the operation of rain over the softer volcanic materials composing the mountains; the whole is almost invariably bounded by magnificent mural precipices rising abruptly from the sea, and frequently rendered inaccessible by soft, crumbling lava, and masses of loose tuff of which they are formed.

There do not seem at present to be any volcanoes or craters which are in action; but there are many which are extinct, varying from fifty to twenty thousand feet in depth. There are fountains of boiling water, and impetuous gushes of hot sulphureous vapours of frequent occurrence, and most of the islands are subject to earthquakes.

A volcanic eruption of a dreadful character is recorded as having occurred in 1591. It lasted twelve days, and destroyed the flourishing town of Villa Franca in the island of St. Michael. An eruption also occurred in the island of St. George, so recently as 1808. An enormous crater was heaved up rapidly to the height of 3500 feet in the centre of the island; and within four days, more than a dozen small craters opened round the principal one. The eruption lasted about five days, and ceased after having destroyed the town of Ursuline, a number of country dwellings, upwards of fifty human beings, and much cattle.

Many instances are recorded, and some of them of very recent occurrence, of sub-marine volcanoes throwing up rocks and islands from the bottom of the sea. Kircher speaks of an island of great magnitude being thrown up in 1538, fifteen leagues to the west of St. Michael's, "which remained unaltered for many years, and then suddenly disappeared and sank to an unfathomable depth." In 1691 numerous little islets were uplifted round the shores of the same island. In 1719, a large circular island nine miles in diameter was thrown up, which disappeared in the year 1723, sinking from the surface to a depth of seventy fathoms. Again, in 1811, on the 13th of June and at the same place, (off the west of St. Michael's,) occurred the volcanic eruption which formed the island of Sabrina: so called from the name of an English man-of-war at that time cruising in the neighbourhood, and whose crew actually watched the rapid formation of the island. It commenced by the ejection of enormous columns of water, smoke, and stones, accompanied by sub-marine explosions. On the 18th the summit of the crater appeared above water; on the 20th it attained the height of 180 feet; and on the 4th of the following month, when the eruption ceased, the island, thus formed, was 300 feet high, and a quarter of a league in circumference; the little crater of which contained a basin of boiling water. All, however, entirely disappeared about the middle of October, and sank to a great depth in the bosom of the ocean.

But the only *sub-marine* volcano which has been satisfactorily observed, is that near the island of St. Michael. It was during a violent earthquake in 1638 that flames and puffs of smoke were seen to arise from the agitated sea. This vast fire extended over a space of several acres; earthy matters and masses of rock were tossed into the air and fell into the sea, upon which they floated. By degrees all these masses were re-united, covering a space of three leagues in length, and half a league in breadth. These eruptions continued during three weeks; all these rocks raised above the sea then disappeared, without a trace being left. The fishermen, witnesses of this catastrophe, took fragments of the rocks ejected from the sea; they burst with a noise, and left nothing but a blackish gravel, which was scoria and volcanic tuff. The crater of the volcano had afforded shelter to great numbers of fish. It was the ordinary rendezvous of the island-fishermen; and at the time of the eruption, the sea ejected so many dead fish, that the air became infected by them. But the most ancient and permanent volcano-mountain is that in the island of Pico, which is about seven thousand feet high, and in the form of a sugar-loaf. It is visible in clear weather, at a distance of ninety miles.

These islands abound with a great variety of mineral waters of the most valuable qualities and temperature,—

And which alone, (says Captain Boid,) might be rendered a source of wealth to the inhabitants, if the condition of the country and the accommodations of life were such as to induce visiters to resort thither to profit by their beneficial effects. Amongst the most valuable, curious, and extensive, are those of the Val das Furnas and Ribiere Grande, in the island of St. Michael; those of Euxofra, near Angra, in the island of Terceira; and at Pico and Flores. The maximum heat of these springs is about five degrees beyond boiling-point, which serves to prove the permanent activity of the subterranean fires. They are rationally supposed also either to prevent earthquakes that otherwise would occur, or to diminish their destructive power by the heated vapours incessantly thrown off to an incalculable extent from these numerous vents.

These *caldeiras*, or *boiling springs*, rise in some parts in columns to the height of ten or twelve feet; they are of various diameters, and the burning vapours resulting from them are formed into clouds, which exhibit a variety of fantastic figures and brilliant tints. The water will boil an egg in two minutes; and the air smells strongly of sulphur, while suffocating mists issue from various crevices. Not far from the caldeiras of St. Michael is the Muddy Crater, a vast cavern filled with mineral substances in a state of constant ebullition, and making a noise equal to that of the sea beating on the shingles.

Amid all these turbulent elements, the scenery of the Azores is extremely beautiful, and the soil is fertile. The air and climate are more mild and agreeable than in any of the countries of Europe, which have the same latitude; and the cold is never so great as to make it necessary to warm the apartments. People afflicted with pulmonary complaints find great benefit in visiting these islands, on account of their more equable temperature. The mountain-slopes are planted with vines, oranges, and lemons; while the rich soil of the valleys is favourable to the growth of all sorts of grain, pulse, and vegetables. Cattle also abound, and these islands are said to furnish some of the best beef in the Old World. Sheep are bred chiefly for the sake of the wool; these islanders not relishing the taste of mutton. Goats and pigs are so numerous as to interrupt the progress of the pedestrian in the streets. Horses are of a small and inferior breed, but asses abound: these, together with bullocks, are usually employed as beasts of burden. All the domestic birds of Europe, and all sorts of game are plentiful. The real canary is one of their singing-birds, which, with many other species of warblers in innumerable quantities raise a loud and enchanting harmony early in the morning and after sun-set. They are well supplied with fish; and the adjacent seas abound with the spermaceti whale, and other oleaginous species; while the coasts of each island produce prodigious quantities of all sorts, calculated to supply the demands of the poor, and to gratify the delicate palates of the rich.

In the insect tribe (says Captain Boid), the most profitable are the bee, the silk-worm, and the cochineal: the honey of the former, however, is of inferior quality, as is supposed on account of the facility with which these little animals procure food from the abundant flowers throughout the year; but the two latter, if under the influence of industry, would prove an immense source of riches to the islands. The most obnoxious insects are flies, gnats, bugs, and fleas, which, during the warm season, infest houses in a most extraordinary degree, the two last arising from the habitual filth and neglect of the inhabitants. If we except the little creatures just named, the islands are free from venomous animals of any sort.

The moral condition of the people may be tolerably well estimated, when we take into consideration the nature of the government of their mother-country, Portugal; under whose auspices, bigotry and indolence were universally fostered. Hence resulted such excessive ignorance, that the commonest rudiments of literature, we are told, had all but disappeared from some of the islands. A new judge having been appointed in the island of St. Mary, thought it desirable to begin, as soon as possible, the amendment of some abuses which he saw was required. He accordingly issued a decree to that effect, and gave orders that it might be stuck up in different parts of the town, for general inspection. But one of his brothers in office, who better knew the literary capacity of the people, told him that such a mode of communication was quite useless, and might just as well be in Hebrew or Arabic; for there were only two women and one man in the whole island that could read!

People of property, and those in business, both men and women, imitate the English in dress. The customs at table are similar to those which are observed in Portugal: all the different articles of food are handed round in separate plates or dishes one after another; the guests help themselves, the cloth is kept on the table till the company rises, and very little wine is taken after dinner.

A future article on the Azores will be chiefly devoted to its botanical productions, and more particularly the ORANGE.

THE slave of pleasure soon sinks into a kind of voluptuous dotage; intoxicated with present delights, and careless of everything else, his days and his nights glide away in luxury or vice, and he has no care, but to keep thought away: for thought is troublesome to *him*, who lives without his own approbation.—DR. JOHNSON.

IT is singular that minor motives should often produce a powerful effect, which is looked for in vain from the highest and the best. Let those who speculate on human nature, and its endless inconsistencies, solve the enigma. A conviction of duty, of responsibility,—the delight of increasing the happiness of others, the policy of guarding our own, how often are they all insufficient to restrain the ebullitions, or to regulate the infirmities of temper; but strange to tell, the elephant, who could trample down an armed host, permits himself to be led by a little child—the faults over which a sense of duty to God have no power, yield to a sense of decorum.

There are persons, indeed, who, on the subject of temper, plead a sort of prescriptive right to indulgence, on the ground of constitutional infirmity or hereditary entailment, but before such pleas can be considered valid in the court of conscience, let them say whether there are no circumstances sufficiently powerful, whether there is no presence sufficiently august, to awe them into self-control—whether, in certain moments of their lives, they have not found the most indignant feelings controllable, the fiercest blaze of passion repressible.

If this be the case, and experience attests the fact, the plea of necessity falls to the ground; and can they forget, that in every moment of their lives they are in a presence the most august, under the vigilant observation of that mighty being, compared to whose glance the gaze of an assembled world is powerless and insignificant?

This is the avowed theory of numbers, who scruple not to darken and trouble the stream of life by capricious waywardness, or unrestrained irritability,—who shed, without remorse, the bitterest drops into the crystal cup of domestic happiness.—*Private Life.*

COTTON constitutes a very important article in the commerce of the Pasha of Egypt. A few years ago the cotton-tree, which had been cultivated to so great an extent by the ancient Egyptians, was only known as an ornamental shrub in the gardens of Cairo. The Pasha, however, learning its valuable properties, caused several experimental plantations to be made, and, these succeeding, turned his attention to its cultivation on a large scale. Two thousand fedans were planted in the provinces of Kelioub, Sharkiah, and Mansourah; and still more extensive plantations were afterwards made in various parts of Upper Egypt.—*St. Jouin's Egypt.*

ENGLAND IN THE OLDEN TIME.

No. IX.

MINSTRELS, JUGGLERS, AND DANCERS. 1.

AMONG the pastimes which high and low loved to visit and to applaud during several centuries in England, were exhibitions in which singing, dancing, tumbling, and juggling were more or less combined. How far the taste for these matters has decreased in our own day we need not say: we shall confine ourselves to by-gone ages, taking the industrious antiquary Strutt as our principal guide.

Early English minstrels were called by different names at different periods: thus we had the British bards, the northern scalds, and the Anglo-Saxon gleemen. The bards celebrated the noble actions of illustrious persons in heroic poems, which they sang to the sound of the lyre. According to Diodorus, "sometimes when two armies were standing in order of battle, with their swords drawn, and their lances extended, upon the point of engaging in a most furious conflict, the bards have stepped in between them, and by their soft and fascinating songs, calmed the fury of the warriors, and prevented the bloodshed." The *scalds* were the bards of Norway, and other northern nations, and were held in as much estimation as the bards among the Britons.

When the Saxons settled in England, the bards became separated into two classes, the *gleemen* or merry-makers, and the *harpers*, or musicians. The gleemen united mimicry and other modes of exciting mirth, to their profession, as well as dancing and tumbling, with sleights of hand and various deceptions. It was therefore desirable for them to associate themselves into companies, by which means they were enabled to diversify their performances, and act as confederates to one another.

In the Anglo-Saxon manuscripts there are many representations of the feats of the gleemen, of which the above cut is one. We here see two persons dancing to the music of instruments that may be called a horn and a trumpet. If the dancers are as tall as the musicians, which was probably the case, their attitudes must be somewhat peculiar, and not without difficulty.

The bards and scalds most probably availed themselves of the harp, to accompany their songs, and modulate their voices. The Saxon gleemen and jugglers did the same, but at the same time it appears that they were equally well acquainted with instruments that more or less resembled violins, flutes, horns, *trumpets, and tabors.* But the harp was the most popular, and was frequently exercised by persons who did not follow the profession of gleemen. As early as the seventh century, it was customary at convivial meetings to hand a harp from one person to another, and every one who partook of the festivity played upon it in his turn, singing a song to the music.

In a manuscript of the tenth century there is a representation of an Anglo-Saxon gleeman, or juggler, throwing up three balls, and three knives, and catching them alternately. We see therefore that *Ramo Samee* has been anticipated by at least eight hundred years. The gleeman is accompanied by a musician, playing on a kind of violin. Both are represented in the cut at the end of the present article. The feat of throwing up a number of sharp instruments into the air, and catching them alternately in their fall, was not entirely confined to the gleemen. It is said of Olaf Fryggeson, one of the early kings of Norway, that he could play with three darts at once, tossing them in the air, and always kept two up while the third was in his hand.

Dancing likewise formed part of the gleemen's exploits. In an old manuscript is a representation of a young man dancing to the music of two pipes and a lyre. In another there is a female dancing, and at the same time approaching to, and receding from, a bear, who is held by a keeper, but is unmuzzled. Another kind of dance was the *sword-dance*, which was practised as well by the Anglo-Saxons as by the Germans, and of which Tacitus thus speaks, with reference to the latter:—"One public diversion was constantly exhibited at all their meetings: young men who, by frequent exercise, have attained to great perfection in that pastime, strip themselves, and dance among the points of swords and spears, with wonderful agility, and even with the most elegant and graceful motions. They do not perform this dance for hire, but for the entertainment of the spectators, esteeming their applause a sufficient reward." Strutt has described a drawing, representing two men, equipped in martial habits, and each of them armed with a sword and a shield, engaged in a mock combat. The performance is enlivened by the sound of a horn: the musician acts in a double capacity, and is, together with a female assistant, dancing round them to the cadence of the music.

To go now to the times of the Normans, we find most of the before-mentioned feats continued, with some modifications, either in name or method. The gleemen changed their name to *minstrels*, and filled the multifarious offices of rhymers, singers, story-tellers, jugglers, buffoons, and poets. The *troubadours* (minne, or love-singers, as they are sometimes called) were a superior sort of rhymers, who originated in the south of France, and who composed songs of a chivalric nature. Kings, knights, and ladies delighted in them, and there is a story of Blondel, troubadour to Richard Cœur de Lion, which shows the intimate connexion which existed between them. Richard, after one of the Crusades, was confined in a castle belonging to the Duke of Austria. Blondel, who was in England, hearing no news of his master, feared that ill had befallen him, and determined to travel till he found him. After much vain search he arrived at a small town, near which was a castle belonging to the Duke of Austria; and having learned from his host that there was a prisoner at the castle, who had been confined for upwards of a year, he went to it, and cultivated an acquaintance with the keepers. But he could neither see the prisoner, nor learn any particulars of him: he therefore placed himself near a window belonging to the tower which contained the

prisoner, and sang a few verses of a song which had been composed conjointly by him and his patron. The king, hearing the first part of the song, repeated the second, which convinced the poet that the prisoner was no other than Richard himself. Hastening, therefore, to England, he acquainted the barons with his adventure, and they, by means of a large sum of money, procured the liberation of their sovereign.

It is however of persons of a lower grade than the troubadours that we are here treating. One such we have said was called a story-teller. An old manuscript states that one of our kings used to keep a story-teller, on purpose to lull him to sleep every night; but some untoward accident having prevented him from taking his repose so readily as usual, he desired the fabulator to tell him longer stories. He obeyed, and began one upon a more extensive scale, and fell asleep himself in the midst of it.

These story-tellers and jesters used to frequent alehouses, and sometimes even the houses of the great, and exhibit their drollery, for what remuneration they could obtain. Besides these, the Norman earls and great barons, who in their castles emulated the pomp and state of royalty, had their poets and minstrels: they formed part of their household establishment, and, exclusive of their wages, were provided with board, lodging, and clothing, by their patrons, and frequently travelled with them when they went from home. Other minstrels were their own masters, and went from castle to castle, from palace to monastery, to perform. They got so much into favour, that they grew impudent, and claimed as a right that which they had hitherto received as a gratuity, and settled its amount according to the estimate which they had formed of their own abilities. This increased so much that it was found necessary to give them a legislative check, about the year 1300.

There was, at the same period, a class of minstrels called *Tregetours*, who appear to have been a sort of conjurors, and whose business was to deceive the eyes of spectators, and produce such illusions as might be supposed to be the effect of enchantment. One of them professed, "by steeping a thread in the liquor produced from snake's eggs bruised, and by hanging it up over a basin of water, to produce water enough in a large hall for boats to row up and down in it." Some would "bring in the similitude of a grim lion, or make flowers spring up as in a meadow;" some would "cause a vine to flourish, bearing white and red grapes, or show a castle built with stone; and when they please, cause the whole to disappear." Sometimes these conjurors exhibited in a room, and at others, on a table, or on a scaffold erected for their use. We shall have to speak more of these conjurors hereafter.

Tumbling was one of the exploits of the jugglers or minstrels. There was a tumbler, in the reign of Edward the Second, who rode before his majesty, and frequently fell from his horse in such a manner that the king was highly diverted, and laughed heartily, and rewarded the performer with the sum of twenty shillings, a considerable sum in those days. There is in one of the Sloane manuscripts a picture of a performer, tumbling over head and heels, another spinning round a basin on the top of a stick, and a third playing the pipe and tabor. In another manuscript there is a representation of a man walking and playing on the bagpipes, with a girl dancing on his shoulders. This appears to have occurred in the thirteenth century.

Other rude drawings of the period represent different feats of balancing. In one there is a girl, habited like a boy, and kneeling on a large broad board, supported horizontally by two men; before her are three swords, the points inclined to each other, and placed in a triangular form: she is pointing to them with her right hand, and holds in her left a small instrument, somewhat resembling a trowel. In another drawing a man is represented as having placed a sword upright on its hilt, and is in the act of doing so with a second sword. In a third instance a man is balancing a sword on the point of his finger, and in a fourth another performer is balancing a coach-wheel on his shoulder. All these are in manuscripts of the fourteenth century, and so is another, in which the performer is balancing a spear on his nose, and holding up his left foot in his right hand.

We have now brought down our notice of these various exhibitors to the fourteenth century, and shall continue it to later periods in the next article.

THE LOVE OF FLOWERS.

The love of flowers seems a naturally-implanted passion, without any alloy or debasing object as a motive; the cottage has its pink, its rose, its polyanthus,—the village its geranium, its dahlia, and its clematis; we cherish them in youth, we admire them in declining days; but, perhaps, it is the early flowers of spring that always bring with them the greatest degree of pleasure, and our affections seem immediately to expand at the sight of the first opening blossom under the sunny wall or sheltered bank, however humble its race may be. In the long and sober months of winter our love of nature, like the buds of vegetation, seems closed and torpid: but, like them, it unfolds and re-animates with the opening year, and we welcome our long-lost associates with a cordiality that no other season can excite, as friends in a foreign clime. The violet of autumn is greeted with none of the love with which we hail the violet of spring,—it is unseasonable; perhaps it brings with it rather a thought of melancholy than of joy; we view it with curiosity, not affection: and thus the late is not like the early rose. It is not intrinsic beauty or splendour that so charms us, for the fair maids of spring cannot compete with the grandeur of matrons of the advanced year; they would be unheeded, perhaps lost, in the rosy bowers of summer and autumn. No, it is our first meeting with a long-lost friend, the reviving glow of a natural affection, that so warms us at this season; to maturity they give pleasure, as a harbinger of the renewal of life, a signal of awakening nature, or of a higher promise; to youth they are expanding, being opening year's hilarity; and the child, let loose from the house, riots in the flowery mead, and is

"Monarch over all he surveys."

There is not a prettier emblem of spring than an infant sporting in the sunny field, with its osier basket wreathed with buttercups, orchises, and daisies. With summer flowers we seem to live as with our neighbours—in harmony and good will; but spring flowers are cherished as private friendships.

RHUBARB.

Familiar as we may be with the name and properties of this plant, we are yet ignorant of the source from whence we derive *true rhubarb*. Many endeavours have been made to discover the precise species which yields this valuable medicine. The countries from which we receive it have been visited with express reference to this object, and much attention has been bestowed on the culture of the different known species, and on the comparison of their roots with the rhubarb of the shops; but these attempts have hitherto proved entirely unsuccessful, nor is it surprising that such should have been the result, when we consider that the labour and difficulty of penetrating into the country where the true rhubarb is supposed to grow, must necessarily be great; while the jealousy of those who have hitherto found it a profitable article of commerce, is sure to lay many obstacles in the way of discovery.

Rhubarb has been in use, as a medicine, for centuries, and until the year 1732 it was believed to be yielded by the species *rheum raponticum*, Linn., so generally cultivated in our gardens for the sake of the leaf-stalks, the agreeable acidity of which, owing to their containing, in common with other plants of the same natural order, a portion of oxalic acid, has brought them into extensive requisition for making tarts and preserves. But the roots of this latter species are found to yield a product very little resembling the true rhubarb, and its cultivation for medicinal purposes has long been abandoned. This species is distinguished by the leaves being roundish ovate, obtuse, pale green, with a few hairs beneath on the nerves and margins. The roots are large and thick, and like those of most of the other species, reddish brown without, and yellow within.

In 1732 some seeds were planted at Paris and Chelsea, as those of the true Rhubarb, but they produced the species *rheum undulatum*, distinguished by its dark green, extremely wavy leaves, and by the redness of its footstalks, the roots of which also differ widely from those of the genuine drug.

Some seeds were obtained by Kaan Boërhaave, in 1750, which produced both *rheum undulatum* and *rheum palmatum*, the latter of which approaches more nearly to the true plant in the colour, taste, and smell of the root, than any other. The leaves of this plant distinguish it from all the other species: they are palmated, with acuminate segments; and though the Bucharian rhubarb merchants know nothing of such a leaf as that of rheum palmatum, and always describe the true rhubarb plant as having round leaves, with waved edges, yet the idea that the plant raised by Boërhaave is the genuine one, has been, and is still, extensively entertained.

In 1790 an apothecary, of the name of Sievers, was sent into Siberia by Catherine the Second of Russia, for the purpose of penetrating, if possible, into the rhubarb country, and of ascertaining the true plant; but after four years' ineffectual effort, he returned with no further information than had been before obtained on the subject. From that time to the present no further attempts seem to have been made to discover the source of true rhubarb, so that a subject of investigation is left open to the scientific botanist, which is well worthy his attention.

Though this plant has not been seen by any scientific person, yet some interesting information has been gathered from the reports of other travellers, as to its growth and production. It is said to be a native of the central parts of Thibet, where it is not made the subject of special culture, but grows spontaneously in sufficient abundance to supply all the demands for it as a drug. Its propagation is greatly assisted by the peculiar habits of the marmot. This little animal, in making its burrow, throws up a quantity of loose earth around it, and in the light soil thus formed, and in a country where marmots abound, the seeds of the rhubarb are said to germinate almost exclusively.

The roots of this plant are gathered in spring and autumn, and the natives, after removing the cortical part, cut them into small pieces, to facilitate the drying. A hole is cut through each piece, and they are then strung upon a small cord, and hung up in the air to dry, beneath a shed which protects them from the rays of the sun, and where they sometimes remain a whole year, before they are fit for sale.

Several kinds of Rhubarb are known in commerce. The most esteemed is *Turkey* or *Russia* rhubarb which was formerly brought to Europe through the Turkish provinces of Asia Minor, but is now received from Russia. It is brought from the native country to the frontier town of Kiachta in Siberia, where it is examined by a Russian government officer. The bad pieces are rejected and burned, and those of good quality are transmitted to Moscow and St. Petersburg, where they undergo a second examination, and any inferior pieces are picked out. On account of this careful selection of the drug, Russian rhubarb is always of good quality, and bears a higher price in the market than any other kind.

Russian rhubarb is offered for sale in pieces, each from one and a half to two inches broad, and two or three inches long. The shape of these pieces is sometimes flat, but more frequently conical. They are always perforated at one end, and occasionally there are other small holes observable, not passing completely through them, but made for the purpose of examining the interior of the specimens. The colour externally is of a bright golden yellow, owing to the pieces being covered with a powder, formed by their friction upon each other. Under the teeth good rhubarb feels gritty, owing to the presence of small crystals of oxalate of lime.

There is a second variety of rhubarb, which is perhaps obtained from the same source as the Russian, but it is known in commerce by the name of East India or Chinese rhubarb, being imported chiefly from Canton and Singapore. It is of inferior quality to the Russian rhubarb, because it is not subjected to the same careful and rigid examination, and portions of the root often come to us in a state of decay. The smell and taste of the Chinese rhubarb are also inferior to those of the Russian, though not in any marked degree, and the price it brings in the market is much lower. Thus while Russian rhubarb in bond is quoted in the official returns of the prices current at eight shillings and three pence per pound, the East India or Chinese is stated to bring only from two shillings and sixpence to four shillings.

Another variety, not superior in value to the Chinese, is the *Dutch-trimmed*, or *Batavian*, which is also brought from Canton or Singapore, and is considered as a distinct commercial kind.

A third variety of rhubarb is the English, which appears to be chiefly the roots of *rheum palmatum*. It was first extensively grown at Banbury in Oxfordshire, by Mr. Hayward, in 1780, and it is still cultivated to a large extent there. About this time very sanguine expectations were formed as to the qualities and cultivation of English rhubarb, and attempts were made to raise it for medicinal purposes, in various quarters; but though it has continued to be cultivated to some extent, its inferiority to the foreign varieties is universally admitted.

English rhubarb is found in the shops under two forms; either in pieces cut so as to resemble the Asiatic kinds, in which case it is called *dressed* or *trimmed*, or in cylindrical pieces, four or five inches long, and about an inch thick, called *stick* rhubarb.

The external appearance of English rhubarb is often deceptive, for it is a common practice to rub the pieces over with the powder of the Turkey rhubarb, in order t make it pass for the more valuable kind; but on removing this powder, the pink colour, light weight, and soft texture, sufficiently denote the inferior quality of the specimen.

The active principle of rhubarb may be regarded as unknown, the chemical analysis of this root being very imperfect. A yellow crystallizable principle has been obtained from it, which appears to be nothing more than the colouring matter of rhubarb, and not its active part. Rhubarb is soluble both in water and alcohol. The former takes up more of the purgative and less of the astringent principles than the latter, hence an infusion is a good method of exhibiting this medicine. The liquid preparations of rhubarb, however, should always be made by *infusion*, and not by *decoction* *, as a high temperature promotes chemical decomposition of the drug.

Rhubarb from its astringency has been supposed to contain tannin, but this has not been satisfactorily proved by chemical experiment. The root contains a certain proportion of starch, and this is most abundant in the English sort, where it may be detected by a somewhat mucilaginous taste.

The medicinal action of rhubarb varies according to the dose administered. It is a gentle stomachic and astringent, when used in small quantities, as three or four grains, while in larger doses of from fifteen to thirty grains, it becomes a mild and easy laxative, devoid of irritating qualities.

The quantity of rhubarb imported into Great Britain in 1835 amounted to 81,100 lbs., and in 1836 to 122,142 lbs., of which in the former year 44,522 lbs., and in the latter 44,568 lbs. were retained for home consumption. The duty, being one shilling per lb., yielded a net revenue of 2220*l.* in the one year, and 2228*l.* in the other.

* In pharmacy, the terms *infusion*, *decoction*, and *tincture*, are in constant use. The object of all three processes is to obtain the soluble portions of a drug in a liquid form. By the first process the drug is steeped in water, either hot or cold: in the second process the drug is boiled in water: in tinctures, spirit alone is used, since many of the active parts of drugs, insoluble in water at any temperature, are soluble in spirit at all temperatures.

MORALITY, distinguished from, and independent of Christian faith, is nothing; but Christian morality is of the very essence, it is the true fruit, the sure testimony, the faithful companion, the glory and perfection, yea, the very life and soul of true Christian faith. Let us beware, that we do not confound things so different as worldly and Christian morality; as the works of the natural man and those of the disciples of Christ! Let us beware how we suppose that because a man cannot be saved by morality of one sort, therefore he can be saved without morality of the other sort; that because one who rejects the Gospel, will not be saved for being a moral man, therefore there is a hope of salvation for an immoral professor of the Gospel! Christian morality assumes to itself no merit—it sets up no arrogant claim to God's favour—it pretends not to "open the gates of heaven;" it is only the handmaid in conducting the Christian believer in his road towards them. Without it no man shall enter in; but they who disesteem and reject it are well apprized by God's word of the evil which they shall incur: when Christ shall command "the workers of iniquity," "the slothful and unprofitable servant to depart from him," and when "vengeance shall be taken in flaming fire on them that know not God, and obey not the Gospel of our Lord Jesus Christ."—BISHOP MANT.

ELECTRICITY.

XIII.

ELECTRICAL EXPERIMENTS.

THE effects of accumulated electricity may be illustrated in a variety of ways. In some instances these effects depend on the nature of the substance operated upon; in others on its bulk, considered in relation to the quantity of electricity transmitted through it; but more frequently it is by the judicious combination of these, and other analogous conditions, that this class of phenomena can be most impressively exhibited.

We have already noticed, that under certain circumstances, electricity will force for itself a passage, not only over the surface but through the substance of a non-conducting body. This sometimes happens with a Leyden jar, either from communicating to it too powerful a charge, or when some part of the jar is thinner than it should be, the charge passing through the glass, and by the small fracture it occasions rendering the jar useless. In this case we have an example of the mechanical effects of electricity, and which may be further illustrated by the following arrangements.

Provide a piece of glass tube, about four inches long and half an inch in diameter; close one of its ends with a cork, and nearly fill the tube with olive oil; to the other end let a cork also be fitted, and a pointed wire passed through it, which must be bent at a right angle, so that the point may press against the side of the tube, a little below the surface of the oil. Let the wire be now connected with the conductor, and the machine set in motion, and on placing the finger, or any other conducting substance, against the tube, exactly opposite the point of the wire, a succession of sparks will pass through the glass, producing in it a very minute hole; and by changing the position of the wire, similar holes may be made in any required direction. In this experiment we observe, that the simple spark by being, as it were, concentrated, is sufficiently energetic to perforate the tube.

Let the *Universal Discharger* * and *Balance Electrometer* † be so arranged, that they may form part of the circuit between the inside and outside coatings of a jar or battery: take a piece of glass tube, about six inches long, and a quarter of an inch in diameter, and fill it with water, stopping both ends very securely with corks: a piece of wire must be inserted in each of the corks, and the ends inside the tube brought within about half an inch of each other. Now place the tube on the table (1) of the discharger, connect the wires with the discharging train, and on passing a tolerably powerful charge through the tube it will be broken. In this case the breaking, or rather bursting of the tube, is occasioned by the sudden expansion of the water it contained; and in performing the experiment, it is advisable to spread a cloth immediately underneath the tube, that the water be not thrown over the other parts of the apparatus.

Having procured some pieces of very dry hard wood, about an inch long, and a quarter of an inch in diameter, let a small hole be drilled at each end, leaving in the middle a space equal to about three-eights of an inch not drilled. Fix pointed wires in the holes, and by means of them pass a charge through the wood, which will be thereby split asunder.

Place between the balls of the discharger a card,

* See *Saturday Magazine*, Vol. XIV., p. 116.
† Ibid. Vol. XIV., p. 290.

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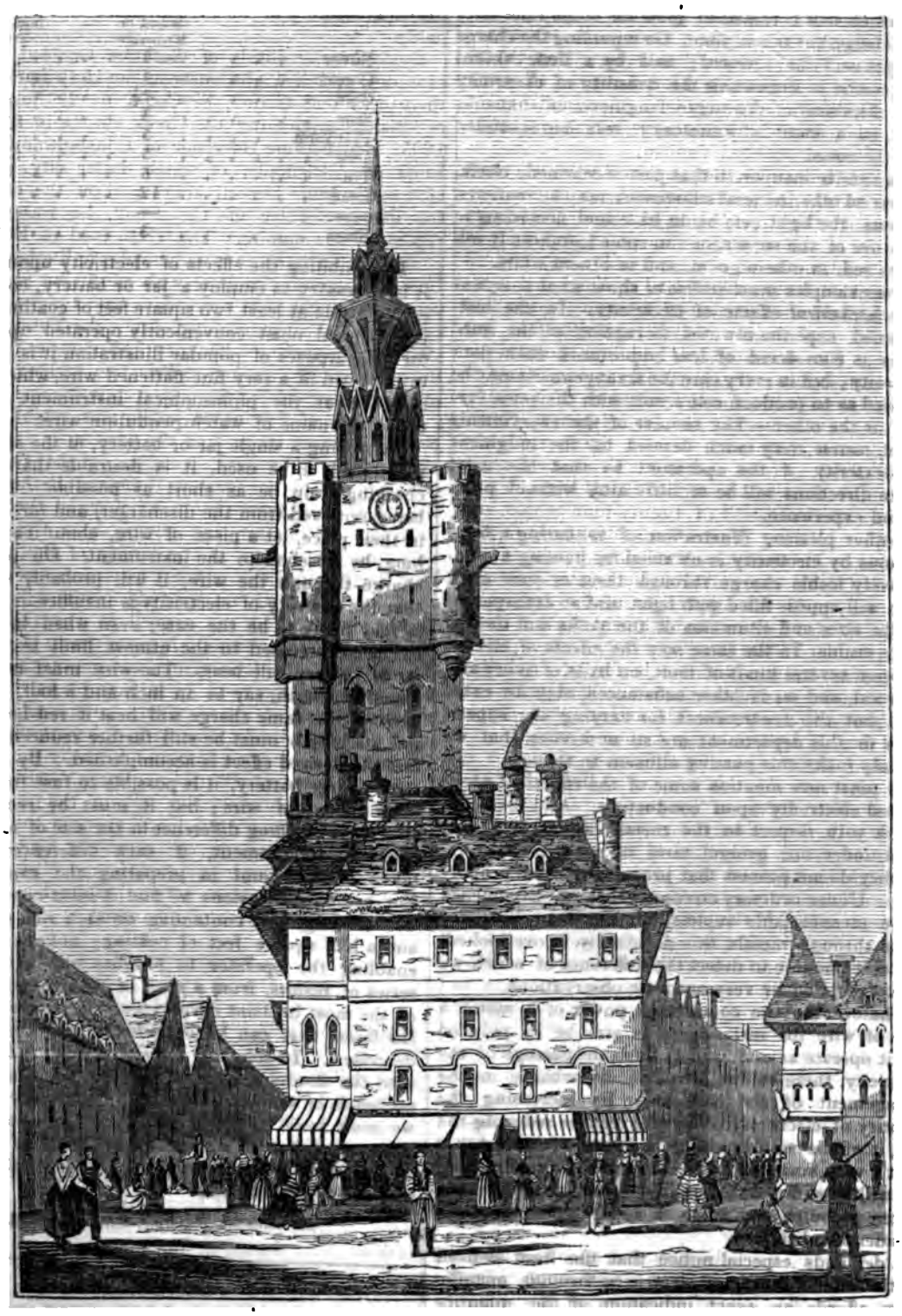
THE TOWN OF BETHUNE, IN FRANCE.



HOTEL DE VILLE, BETHUNE.

or a few folds of smooth paper; pass a charge through the apparatus, and the card or paper will be perforated. By increasing the power of the charge, several cards may be perforated at once, the hole being surrounded by a rough projecting bur, which gives to it an appearance of having been torn by the passage of a solid body.

A piece of loaf-sugar in the form of a wedge or cone being placed between the balls of the discharger, let the room be darkened, and a charge passed through the sugar, when it will instantly become phosphorescent; exhibiting a broad line of beautiful pale green light which will continue to glow for some time after the discharge has taken place. On repeating the charge the light will be renewed; and by a little skilful management in regulating the quantity of electricity and in disposing of the sugar, fragments of that substance, in a state of luminosity, will be scattered about the room.

In a similar manner to that just mentioned, chalk, and several other mineral substances, may be rendered luminous, the light varying in its colour according to the nature of the substance: in some instances it will be deep red, in others green, and in others white.

These examples must suffice to show what is meant by the *mechanical* effects of electricity. In the last-mentioned experiments the disruption of the substances is considered of less importance than their luminosity; but in every case the arrangements may be so varied as to produce one result with the same certainty as the other.—The success of the experiments will, of course, very much depend on the judgment and dexterity of the operator; so that the most minute directions will be of little avail without practice and experience.

Another pleasing illustration of rendering a body luminous by electricity is obtained by passing a comparatively feeble charge through three or four eggs, which will appear filled with light, and so transparent that the sizes and situations of the yolks will de distinctly visible. In the same way the effects of electricity upon several kinds of fruit, on balls of ivory and box-wood, and many other substances, may be exhibited; but the contrivances for varying the experiments in this department are so numerous that we can only make this passing allusion to them.

We must now mention some of the effects of accumulated electricity upon conductors. And here we remark with respect to the metals, which are comprised under one general term of good conductors, that they do not possess that property in equal proportions. Under ordinary circumstances, in consequence of the inconceivable rapidity with which electricity passes through metals, this peculiarity is overlooked. Nor is it possible to detect the difference of which we speak excepting by very accurate observations.

Whatever be the conducting power of a metal, a piece of wire for instance, if its size be so reduced that it operate as an impediment to the passage of the electricity, there will be a visible disturbance in the arrangement of the particles. By increasing the quantity of electricity, or by still further reducing the wire, it will be heated red-hot, and having attained that point a very small addition to the quantity of electricity will be sufficient to fuse the metal; scattering the molten globules in a state of vivid combustion to a considerable distance.

It demands especial notice that the heat evolved by the transmission of electricity through metallic wires affords an exact indication of the quantity employed; for without reference to the space over *which the electricity is* distributed, it is found that *the same quantity will* invariably produce corresponding results on wires of the same sizes and lengths. It matters not, therefore, whether we use a single jar or a large battery; for, provided the quantities are equal, we may be quite certain that the effects in each case will be exactly alike.

The experiments connected with the fusion of metals are exceedingly interesting, furnishing abundant opportunities for testing the accuracy of Mr. Harris's *unit-jar**, by means of which, in conjunction with another ingenious piece of apparatus, that gentleman has obtained the results as to the relative conducting properties of metals, which are set forth in the following table:—

	Ratios of Resistance.	Ditto of Heat evolved.
Silver	1	6
Copper	1	6
Gold	1½	9
Zinc	3	18
Platinum	5	30
Iron	5	30
Tin	6	36
Lead	12	72
Brass	3	18

In exhibiting the effects of electricity upon metals, it is necessary to employ a jar or battery, containing on each side at least two square feet of coating. Iron is the metal most conveniently operated upon, and for the purposes of popular illustration it is prepared in the form of a very fine flattened wire, which can be obtained at the philosophical instrument makers', under the name of watch-pendulum wire.

Supposing a single jar or battery, of the size above mentioned, to be used, it is desirable that the discharging train be as short as possible. The balls being removed from the discharger, and forceps fixed in their place, let a piece of wire, about two inches long, be attached to the instrument. On passing a charge through the wire, it will probably be found that the quantity of electricity is insufficient, and this is very likely to be the case, even when the charge has been increased to the utmost limit of what the jar or battery will bear. The wire must now be reduced in length, say to an inch and a half, and then perhaps the same charge will heat it red-hot, but if not, its length must be still further reduced, until at last the desired effect is accomplished. By means of a very large battery, it is possible to fuse from six to sixty inches of wire; but it must be remembered that a very trifling difference in the size of a wire will cause disappointment, if such differences be not taken into account in preparing the experiments. For ordinary occasions we find it most convenient to use one large jar, containing on each side about two and a half square feet of coating; a little attention enabling the operator to produce with it a regular series of results, from a state of dull redness to that of the most brilliant coruscation. The wire we use is the finest that can be obtained of the kind already described. In selecting a piece of wire, and in fixing it to the discharger, we must take care that there be no bends or sharp angles in it. After every discharge we must avoid handling the apparatus, until we have ascertained that no residual charge remains in the jar, and which is more likely to happen with these than any other experiments.

* See *Saturday Magazine*, Vol. XV., p. 28.

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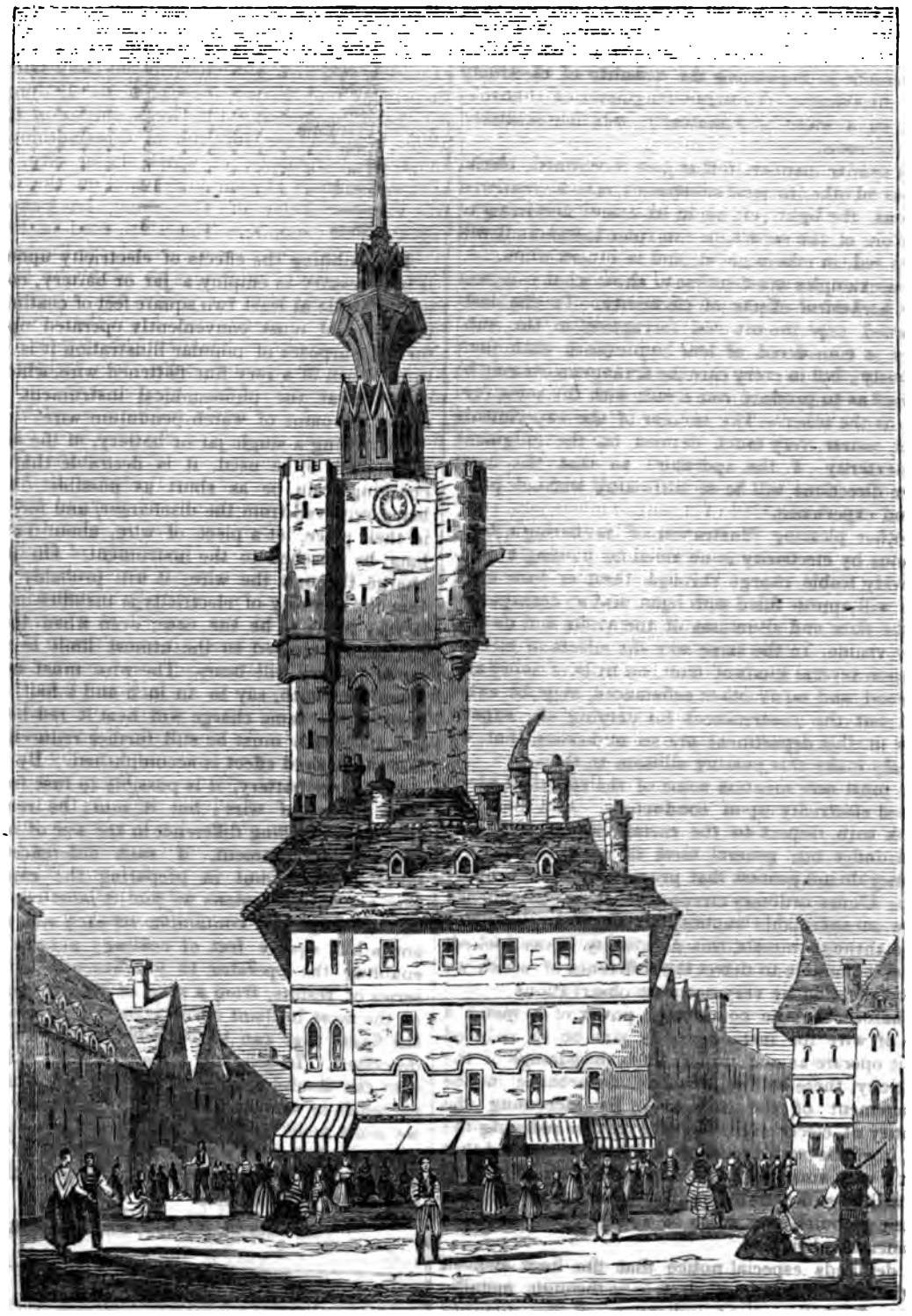
THE TOWN OF BETHUNE, IN FRANCE.



HOTEL DE VILLE, BETHUNE.

THE TOWN OF BETHUNE,

IN FRANCE.

Bethune is a little town in the north of France, situated in the department of the Pas de Calais. Under the ancient division of the kingdom it was comprised within the Province or County of Artois, which formed a part of what was generally termed the French Netherlands, though not of the province which was specifically called Flandre; and it held the third place among the towns of that district. It is now the capital of an arrondissement containing eight cantons; and its rank among the towns of the department is but the sixth in point of population. It has between 7000 and 8000 inhabitants, a smaller number than either Arras, Boulogne, Saint Omer, Calais, or Aire. Bethune is a fortified town of some strength; its form is nearly triangular, and one of the angles is occupied by the castle, which was built by the celebrated Marshal Vauban.

Bethune is built upon the banks of the little river Bietre, or Lave. Its general appearance is not very prepossessing, the streets being bad, and the houses ill-built; it has, however, a fine place or square—which is said to be of a considerable size, and to possess much beauty. The *Hôtel de Ville*, or town-house, which forms a portion of it, is among the best public edifices of the town; it is represented in our engraving. The ecclesiastical buildings possess no peculiar attractions; the principal among them is somewhat remarkable for the elegance of its nave, which is supported by very slender columns. Before the Revolution there was, besides the two parish-churches of Saint Waast and Sainte Croix, a collegiate chapel of Bethune, dedicated to Saint Barthélémy; its chapter was composed of twenty-four canons and as many chaplains. There were also two priories, four convents for women, and religious houses of the order of Capuchins, and Recollets or Reformed Franciscans; until the suppression of the Jesuits in France, they also had an establishment in this town, with a revenue of 8000 livres.

The country around Bethune is fertile, producing corn in abundance; it also affords excellent pasturage. Flax is grown to a considerable extent; "an arpent of good flax" is spoken of by Arthur Young, under the head of Bethune, as "worth more than one of wheat; yet *good* wheat is worth 200 livres." Cole-seed is another article of its produce, and is cultivated largely, but chiefly for the sake of the oil, which is expressed by the aid of mills in the immediate neighbourhood of the town. The cheeses of Bethune are renowned as excellent; they are consumed to a great extent in the neighbouring departments, and thus the manufacture of them gives rise to a traffic of some importance to this little town. There is a navigable canal running from the river Lys to Bethune, where it forms a beautiful dock capable of admitting large barges.

Bethune first came under the dominion of the French crown in the middle of the seventeenth century; it was captured in 1645 by Gaston Duke of Orléans, in the war which France carried on against the King of Spain and the Emperor of Germany, during the minority of Louis the Fourteenth, and the possession of it was definitively secured by the Treaty of the Pyrenees in 1659. The celebrated Vauban was afterwards employed to fortify it; and the skill and care which he bestowed upon it rendered it a strong place. Nevertheless, it was captured from the French by the Duke of Marlborough in the early part of the eighteenth century. The siege began on *the 15th of July, 1710*; two regular attacks were made, and on the 28th of August following, the town surrendered. At the peace of Utrecht, in 1713, this conquest was restored, and Bethune has ever since remained annexed to the French crown.

Though Bethune is but a small town, its name sounds familiarly in our ears, from the circumstance of its having given a title to one of the most illustrious houses of France, among whose members not the least renowned is the famous Maximilien Bethune, Duc de Sully. The seigneurs, or lords, to whom it belonged before it was incorporated with the kingdom of France, were a noble race of high antiquity, and large possessions, connected by alliances with the principal families of that country and of the Netherlands.

Some of the Lords of Bethune engaged in the crusades, and died gloriously in the Holy Land; and there was one Conon, or Colon de Bethune, who assisted in conquering the Greek empire in the year 1203. He became Governor of Constantinople and Lord of Adrianople, of which latter city his son afterwards made himself king; and on the death of the emperor Peter of Courtenay, he was named regent of the empire. The sixth lord of Bethune, Robert the Fifth, came as ambassador to England from Count Philip of Flanders, with whom he had been previously engaged in a crusade, and afterwards accompanied the French king, Louis the Young, on a visit to the tomb of Thomas à Becket at Canterbury; he then returned to Palestine and was killed at the siege of Ptolemais.

A branch of this noble family was established in Scotland, about the end of the twelfth or the beginning of the thirteenth century, by the Count of Aumale, one of the sons of Robert of Bethune, the Fifth. One of his descendants married the heiress of a lord of Balfour, and having been thus united with the possessions of the family of Bethune, he took the title of Balfour, which his successors retained after him. "There is no family in Scotland," says the *Dictionnaire*, "which has arrived at greater honours either in church or state. It has given to the church one cardinal, three archbishops, and many other dignitaries; to the state, two high chancellors, one high treasurer, besides chamberlains, ambassadors, and other great officers." The cardinal here spoken of is the individual more commonly known by the slightly corrupted name of Beaton or Beton,—who was so remarkable for his Catholic zeal, in the persecution of the Protestants of Scotland, towards the middle of the sixteenth century, and especially for the share which he had in the burning of George Wishart, their famous preacher, a crime which hastened not a little the tragical termination of his career.

LIGHT.

It was a sublime idea of one of the ancient philosophers, that, if the Almighty were to become visible to mankind, he would choose truth for his body, and light for his shadow. Indeed, there are few subjects upon which the natural philosopher lingers with more instruction and admiration, than upon the laws which regulate the various and the splendid phenomena of optical science. The theories of the production and the propagation of light, have long engaged the master-minds of first rate mathematicians, to whom it presents subjects worthy of the most refined analytical skill. To trace the progress of a ray of light, through its various reflections and refractions, (whether as concerns the exquisite mechanism of the human eye, or that admirable specimen of human ingenuity, the

reflecting telescope of the astronomer,) is productive of the most valuable results. To decompose such rays, and estimate the varieties of colour so produced; to extend the information thus acquired to the infinite variety of nature's beauteous aspect, from the plainest flower to the rainbow's splendid arch:—all this forms but a small part of the study of that wonderful fluid (if such we may call it) which, when God created, he pronounced "good."

When in the full possession of so great a blessing as light, it is often difficult for us correctly to estimate all its advantages. Experience would tell us, that deprivation alone makes us sensible of the value of a recent possession. Man, in his restless progress through life, is continually struggling to gain a position beyond the one he actually occupies; a prospective advantage, which his fond and ardent fancy presents to him, not only as desirable, but as almost capable of ensuring perfect felicity. A being of warm hopes and high aspirations, he is not content with a stationary position. He struggles to improve it, and often barters certain good for imaginary felicity. What wonder, then, if he sometimes exchange his pure gold for dross covered over with glittering tinsel, whose worthlessness actual possession and use can only detect.

As by contrasting his present inferior position with the happiness of that which he may have lost, a man learns to value above all price the good which he may no longer call his own; so may we learn to value the gifts with which we are blessed, if we can, for a moment, so far put aside our instinctive selfishness, as to place ourselves in the situation of one whose means of communication with the external world are fearfully limited:—of one deprived of sight. By contemplating such an one, and transferring his deprivation to ourselves, we can, perhaps, learn to value the possession of a sense, with which, if suddenly deprived of it, we should think the very desirableness of our existence is united. Great, indeed, must be the love, when so mighty a mind as that of our immortal Milton, so rich in stores within itself,—

> A genius universal as his theme;
> Astonishing as chaos, as the bloom
> Of blowing Eden fair, as heaven sublime:

when such a mind, which we should think securely depended upon external objects for support, pours out its plaint in language, as remarkable for its fervid and convincing power of truth, as for its poetical aspiration, we are enabled to form a somewhat correct idea of the value of light, and of the organ by which it is appreciated.

> ——— Thus with the year
> Seasons return; but not to me returns
> Day, or the sweet approach of even and morn,
> Or sight of vernal bloom or summer's rose,
> Or flocks, or herds, or human face divine;
> But cloud instead, and ever-during dark
> Surrounds me, from the cheerful ways of men
> Cut off; and for the book of knowledge fair,
> Presented with a universal blank
> Of Nature's works to me expunged and rased,
> And wisdom at one entrance quite shut out.

[Tomlinson's *Natural Philosophy.*]

Where are divers opinions, they may be all false; there can be but one true: and that one truth oft-times must be fetcht by piecemeal out of divers branches of contrary opinions. For, it falls out not seldom, that truth is through ignorance or rash vehemence, scattered into sundry parts; and like to a little silver melted among ruins of a burnt house, must be tried out from heaps of much superfluous ashes. There is much pains in the search of it, much skill in finding it; the value of it once found, requites the cost of both.—Bishop Hall.

SELTERS WATER.

Three leagues from Limburg is Niederselters. The mineral water of this place is one of the most famous in Germany. The spring is situated at the top of a mountain in the midst of a wild and dreary country. It was only discovered between the years 1500 and 1550, and was filled up during the thirty years' war. The excellent qualities of this water do not seem to have been formerly appreciated, as the annual rent was at one time only two florins, twenty kreuzers. Towards the end of the eighteenth century it rose to five florins, and in twenty years afterwards to fourteen thousand florins. When the electors of Treves, to whom the spring belonged, took an account of it, it produced annually eighty thousand florins. This water contains a great deal of alkali, which contributes to dissolve the iron in it. The moderate combination of this substance with the carbonic gas, causes the use of this water (which is easily preserved,) in almost every country. It is even sent to both the Indies. Since 1803 this spring has become the property of the duchy of Nassau. The sale of it varies extremely, and depends entirely on the weather; if the summer is warm, more of this water is consumed, since it is then taken as an agreeable beverage as well as a salutary medicine. When mixed with wine and sugar it resembles champagne in taste, but is more refreshing. In a recent year upwards of a million and a half of pitchers of it were exported. It may scarcely be thought possible to fill so many pitchers, each of which contains three pounds of this liquid, from the water of a single fountain, if it is considered that it can only be drawn in five months of the year, and consequently (deducting Sundays and holidays) that seven thousand pitchers must be filled each day, covered on the top and sealed with resin. But all this may be easily believed when the manner in which it is done is made known. It was formerly accomplished by stout peasant girls, who had acquired great dexterity in the employment: but for some years past a machine has been used, by means of which a large number of pitchers are at once plunged beneath the water and drawn out when full. In 1822 the number of pitchers and half-pitchers filled here amounted to 1,900,000. The operation commences early in the morning, and continues till eleven o'clock, during which time no other persons may draw water. From eleven till one, in the middle of the day, the neighbouring persons are allowed to procure water, but no person is permitted to get more than a man can carry: carriages may not come to the fountain, they must load at the warehouse, where one hundred pitchers, sealed with resin, will cost fourteen florins. From one till seven o'clock pitchers are filled for government.—Schreiber's *Rhine.*

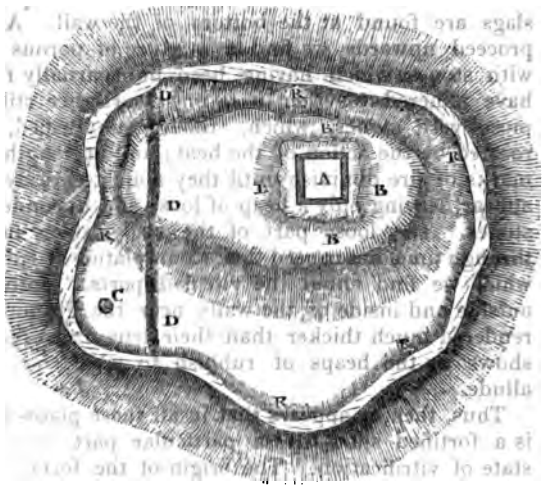
ON INTELLECTUAL ENJOYMENTS.

It is not only with reference to the supply of his physical wants to the gratification of his physical perceptions, and to the acquisition of a mastery over the material things around him, that man finds a source of happiness in his intercourse with nature, and the knowledge it is permitted him to acquire of the mighty secrets of creation.

The relation between himself as a whole, and the material portion of himself, and the *material* portion of that which surrounds him, does not constitute the *whole* of his active being. He has another being, separate and distinct from that which is the subject of sensation; he has other thoughts, other wishes, other hopes, than those which link themselves with matter, other than those which are coupled with the necessities or gratifications of his perishable body.

On these other thoughts, wishes, and hopes, who, raised above the necessity of devoting the whole of his energies to the supply of his daily wants, does not feel the power? There is probably no period in the history of mankind in which a large portion of their number have not been relieved from this necessity; and accordingly there is no known period in their history in which may not be traced the operation of these thoughts, hopes, and wishes, separated from the mere brute perceptions of the individual, and fixed upon the solemn mysteries of the universe. It is in the hopes, the fears, and the enjoyments of this intellectual portion of his being that consists the abstract love of knowledge,—of knowledge for its own sake: and in proportion as the intellectual predominates over the sensual part of him, will that love, that thirst after understanding, be more intense. It is manifest that it belongs more especially to a state of society in which knowledge applied to the physical wants of mankind has, to a certain extent, rendered them independent of those wants.—M.

VITRIFIED FORTS OF SCOTLAND. No. I.



PLAN OF THE VITRIFIED FORT ON THE SUMMIT OF DUN CREICH.

The notice of antiquaries and learned men generally, has been directed for more than half a century, to some remarkable objects in the north of Scotland, generally known by the name of *Vitrified Forts*. But although the attention of Sir G. Sinclair, Dr. Macculloch, Dr. Anderson, Dr. Tytler, and others, has been drawn to the subject, and many theories started, the true origin and nature of these forts is involved in doubt! We shall, in the present article, describe several of them; and in another article, we shall briefly consider the theories which have been offered for their explanation.

In the county of Sutherland, in the northern part of Scotland, there is a ridge of rocks projecting into the Frith of Dornoch, and terminating in an abrupt precipitous hill, called *Dun Creich*, or the *Hill of Creich*. Round the edge of the summit of this hill, there is a rampart of loose stones, marked on the accompanying plan by the letter R. A marks the site of the remains of a building constructed of stone and lime. It is about thirty feet square, the walls being three feet thick, but not now more than four feet high. On the outside of this building, as marked by the letter B, is another rampart of loose stones, which is probably the remains of a structure intended for the same use, but which has been exchanged for the more substantial and convenient building within. C is a well, which has been filled up. There is a very good spring of water on the outside of the rampart, on the south side of the hill. D marks a line on which there is a line of stones, bearing abundantly the marks of fire, and which is to be traced across the whole summit. The surface of the hill within the outer rampart is uneven and rocky; and that part of it which is crossed by the vitrified mass, is rather lower than the eastern portion. The line D represents the only portion which is vitrified, and it passes over the top of the hill in the only direction in which a range of signals could be made, so as to be distinctly seen further up the country:—this fact has an important relation to a theory which we shall have to allude to hereafter. In our next paper we shall give a representation of Creich hill, with the fort upon it. We must now speak of other vitrified masses in different parts of Scotland.

At about two miles from the town of Dingwall in the county of Ross, is a hill called *Knock Farril*, forming a double ridge, which bounds the valley of Strathpeffer. There is a flat area on the top about 135 yards long, and 45 wide. Round the area, and close to the edge of the hill, there are masses composed of stones cemented together by melted matter, irregular in their positions and sizes, and extending at each end about fifty yards from the area. The vitrification is everywhere superficial, extending but a very little way among the stones.

In Kirkcudbrightshire, about half a mile S. E. from the church of Anwoth, is a steep rocky hill about 300 feet high, which has been fortified in the most accessible places by a double fosse. The top, which forms a level area 30 paces long and 20 broad, is nearly surrounded with an irregular ridge of loose stones, intermixed with vast quantities of vitrified matter. The stones, consisting of the common blue schistras of the country, have been softened, twisted, and partly fused by the fire. These heaps of loose stones and vitrified matter are scattered irregularly over the top of the fort, and exhibit no appearance of having ever formed a continued wall. The vitrification is only partial and superficial, and seems to have been the accidental effect of large fires:—but as this is one of the theories of explanation, we must leave it till the next article.

In Perthshire there is a hill called Barryhill, whose summit is levelled into an area 182 feet long, by 72 broad. Around the area a mound of earth was raised, from 6 to 8 feet high, and 10 to 12 broad at the top. On this mound a wall of freestone was built, without any cement whatever. The foundation of the wall was composed of rough granite, and still remains. It is of the same breadth with the summit of the mound; but the height of the wall cannot be now known. Among the ruins are several pieces of vitrified stone. Along the west and north borders of the area, are barracks or huts of dry stone, and sufficiently sheltered by the mound or wall; but no structures of this sort can be traced in the south part of the area. As the north and west sides of the hill are steep, and of difficult access, there was no need of an outer ditch in those quarters; but towards the south and east, there is a ditch 10 feet broad, and 12 to 16 feet below the foundation of the wall. At the south-east extremity of the fort, a narrow bridge was raised over the ditch, 18 feet long, and 2 broad, except towards the ends, where the breadth was increased. It was composed of stones, laid together without much art, and vitrified above, below, and on both sides, so that the whole mass was firmly cemented. A few yards distant from the ditch, there is an outer wall, the foundation of which is about 8 feet lower than the summit of the mound. The approach to the fort is towards the north-east, along the verge of a precipice; and the entrance was secured by a bulwark of stone, the ruins of which are extant. There is no vestige of a well within the fort; but westward, between the basis of the mound and the precipice, there was a deep pond or lake, recently filled up by the tenants of that neighbourhood. About a quarter of a mile eastward, on the declivity of the hill, there are some remains of another oval fort, of less extent than the preceding, consisting of a strong wall and ditch. Tradition says that there was a subterraneous communication between these forts, which is not improbable.

In the island of Bute, in the parish of Kingarth, there is a vitrified fort; and in Cantire, at the entrance of the bay of Carradale, on a small island, vitrified masses enclose about a rood of ground. Some others have been observed, in Argyleshire, particularly one on the hill of Duns Keig, which commands the entrance of Loch Tarbert. On the same hill, ramparts are seen constructed with dry stones, without any vitrification.

From a hill called Laws, near the village of Drumsturdymuir, about five miles north-east from Dundee,

there is an extensive view of the sea and adjacent country. The area on the summit is 133 yards in length, and 66 in breadth; and all round it are to be seen the vestiges of a broad rampart. On the east end, from which the most extensive view is obtained, are large masses of vitrified stones.

In Aberdeenshire is a hill called the Top of Noth. The summit of this hill, on all sides, presents to a person who approaches it, a sloping mound or pile of loose stones, of different sizes and shapes, few of them larger than a man may lift with both hands, though some few are ten times that bulk. When we get on the top of this mound, or enter by an opening at the east end of it, we discover that it does not consist of a *heap* of such stones so as to make a large cairn, but that there is an open area of grass ground in the middle, about sixty yards long and twenty-five wide. The mound of stones which surrounds this space has, on the inside, the appearance of a thick strong wall that had for a long time been in ruins. The height of these ruins above the inner area is pretty uniform, and may be from nine to twelve feet. A slight inspection discovers, that what has the appearance of a ruinous wall, has never been connected together by any cement, as nothing of that sort can be discovered where it might most probably be found. But, at the same time, there are symptoms that very large masses have been formed by the union of smaller stones fused by the force of fire in various degrees.

In the same county is the hill of Dun's Deer, in the vale of Garioch, on which there are also vitrifications; and, as in Dun Creich, the remains of a building constructed with lime-mortar. This tower is of larger dimensions, and of greater strength, than that on Dun Creich, being sixty feet square, and the walls about twelve feet in thickness.

About four miles east from Forfar is the castle hill of Tillhaven, the vitrifications on which have led Dr. Anderson to compare them to the effect of fire upon a lime-kiln; and he represents them as having been produced by the irregularity of the weather, the wind blowing sometimes hard, sometimes gently. The walls in some parts of this fort have been laid bare, so as to appear at least ten feet high. The stones are in courses, and banded, and have been very unequally and irregularly affected by the fire, and some of them not at all: seven or eight varieties of stone appear to have been made use of. Had there been an intention to vitrify this wall, the most fusible stones would probably have been selected; but instead of this, they have been placed in the wall indiscriminately with others.

A few miles from Fort William, in the parish of Kilmalie, is the hill of Dundhairdghall, the summit of which is surrounded by a vitrified mass of stone. This hill commands a view of a great part of Maingre, and the whole of Glen Navis. In the valley of the Beauly river, in Inverness-shire, about two miles north-west of the church of Kilkarlity, is also a vitrified fort, called Dun Thionn. It is circular, and about thirty yards in diameter.

The hill of Dun Mac Sniothain is nearly precipitous along the quarter of its circumference, and a series of parallelogramic works have been constructed so as nearly to cover the principal and precipitous part of it to the very edge. The greater portion of the hill being thus occupied by two of these works, the strongest part was cut off by a wall from the more accessible end. The thickness of the walls of this fort is about twelve feet. They bear the marks of vitrification throughout their whole extent, but in some places it is more complete than in others. In no case does it seem to have extended more than a foot or two from the foundation; and the most perfect slags are found at the bottom of the wall. As we proceed upwards, we find a mixture of porous slag with stones, which having been but partially fused have adhered together in a mass. Higher still we meet with stones, which, though unvitrified, are roasted by the action of the heat; and at length the marks of fire diminish until they almost entirely disappear, leaving only a heap of loose and unconnected stones. The loose part of the wall having fallen, through time, has caused that accumulation of rubbish which we find about the vitrified parts. Both the outside and inside of the walls near the ground are rendered much thicker than their true measurement shows by the heaps of rubbish to which we here allude.

Thus, then, it appears that in all these places there is a fortified spot, with a particular part of it in a state of vitrification. The origin of the forts themselves is easy to imagine; being for places of defence in unsettled times. But the cause of the vitrification is still a mystery; and we shall in another paper detail the principal theories which have been advanced on that subject.

MOZART.

A few anecdotes of the early proficiency of Mozart in his favourite science may not be unacceptable to the lovers of music.

Mozart was scarcely three years old when his father began to give lessons on the harpsichord to his sister, who was then seven. His astonishing disposition for music immediately manifested itself. His delight was to seek for *thirds* on the piano, and nothing could equal his joy when he had found this harmonious chord. When he was four years old, his father began to teach him, almost in sport, some minuets, and other pieces of music. Mozart would learn a minuet in half an hour, and a piece of greater extent in less than twice that time. Immediately after, he played them with the greatest clearness, and perfectly in time. In less than a year, he made such rapid progress, that at five years old he invented little pieces of music which he played to his father, and which the latter, to encourage the talent of his son, wrote down. The elder Mozart, returning from the church one day with a friend found his son busy in writing. "What are you doing there, my little fellow?" asked he. "I am composing a concerto for the harpsichord, and have almost got to the end of the first part." "Let us see this fine scrawl." "No, I have not yet finished it." The father, however, took the paper, and showed his friend a sheet full of notes, which could scarcely be decyphered for the blots of ink. The two friends at first laughed heartily at this piece of scribbling; but, after a little time, when the father had looked at it with more attention, his eyes were fastened on the paper, and at length overflowed with joy and wonder. "Look my friend," said he, with a smile of delight, "everything is composed according to the rules: it is a pity that the piece cannot be made any use of; but it is too difficult: nobody would be able to play it." "It is a concerto," replied the son, "and must be studied till it can be properly played. This is the style in which it ought to be executed." He accordingly began to play, but succeeded only so far as to give them an idea of what he had intended.

When taken to Vienna, the young Mozart performed before the court. The emperor Francis the First said to him, in jest, on that occasion, "It is not very difficult to play with all one's fingers, but to play with only one, without seeing the keys, would indeed be extraordinary." Without manifesting the least surprise at this strange proposal, the child immediately began to play with a single finger, and with the greatest possible precision and clearness. He afterwards desired them to cover the keys of the piano-forte, and continued to play in the same manner, as if he had long practised it.

From his most tender age, Mozart, animated with the true feeling of his art, was never vain of the compliments

paid him by the great. He only performed insignificant trifles when he had to do with people unacquainted with music. He played, on the contrary, with all the fire and attention of which he was capable, when in the presence of connoisseurs, and his father was often obliged to have recourse to artifice, and to make the great men, before whom he was to exhibit, pass for such with him. When Mozart, at the age of six years, sat down to play in the presence of the emperor Francis, he addressed himself to his majesty, and asked, "Is not M. Wagenseil here? We must send for him. He understands the thing." The emperor sent for Wagenseil, and gave up his place to him by the side of the piano. "Sir," said Mozart to the composer, "I am going to play one of your concertos; you must turn over the leaves for me."

On Mozart's return from Vienna to Salzburg, he brought with him a small violin which had been given him, and amused himself with it. A short time afterwards, Wenzl, a skilful violin-player, who had then just begun to compose, came to Mozart, the father, to request his observations on six trios, which he had written. Schachtner, the archbishop's trumpeter, to whom Mozart was particularly attached, happened to be at the house, and we give the following anecdote in his words. "The father," said Schachtner, "played the bass, Wenzl the first violin, and I was to play the second. Mozart requested permission to take this last part; but his father reproved him for this childish demand, observing that as he had never received any regular lessons on the violin, he could not possibly play it properly. The son replied that it did not appear to him necessary to receive lessons in order to play the second violin. His father, half angry at this reply, told him to go away, and not interrupt us. The child was so hurt at this that he began to cry bitterly. As he was going away with his little violin, I begged that he might be permitted to play with me, and the father, with a good deal of difficulty, consented. 'Well,' said he, 'you may play with M. Schachtner, on condition that you play very softly, and do not let yourself be heard, otherwise I shall send you out directly.' We began the trio, little Mozart playing with me; but it was not long before I perceived, with the greatest astonishment, that I was perfectly useless. Without saying anything, I laid down my violin, and looked at the father, who shed tears of affection at the sight. The child played all the six trios in the same manner. The commendations we gave him made him pretend that he could play the first violin. To humour him, we let him try, and could not forbear laughing, on hearing him execute this part, very imperfectly it is true, but still so as never to be set fast."

When Mozart was in his seventh year, his family set out on their first expedition beyond the boundaries of Germany. The tour commenced with Munich, where the young artist played a concerto on the violin, in presence of the Elector, after an extempore prelude. On their arrival in Paris, Mozart and his sister performed at Versailles, and the former played the organ of the king's chapel, before the court. In April, 1764, the Mozarts went to England, and the children performed before the king, and, as at Versailles, the son played the organ of the royal chapel. His performance on the organ was thought more of at London than his exhibitions on the harpsichord.

Though the child every day beheld new proofs of the astonishment and admiration inspired by his talents, it neither rendered him proud nor self-willed: a man in talent, in everything else he was an obedient and docile child. Never did he appear dissatisfied with anything that his father ordered. Even after playing the whole of the day, he would continue to do so, without showing the least ill-humour, when his father desired it. He understood and obeyed the slightest signs made by his parents, and carried his obedience so far as to refuse the sweetmeats which were offered him, when he had not their permission to accept them.—*Life of Mozart.*

THERE is a tribe of monkeys in Trinidad who have a great aversion to water, and if obliged to cross a narrow stream they climb a tree near the bank, and form a chain by hanging from the tails of each other; the whole string of animals then swing backwards and forwards until the lowest, to whom the post of honour has been assigned, alights on the opposite bank, and pulls over, by the aid of the "tail," his companions on the tree and bank; this singular operation *is carried on amidst terrible* howling, and with the most *frightful cries and grimaces.*—MARTIN'S *British Colonies.*

ON THE CUTTING DOWN OF OAK TREES.

OAKS, like all other trees, vary exceedingly in their growth, according to soil, situation, &c., consequently, some will come to maturity much sooner than others, and will attain, in a given time, to a much larger size. No *one fixed* period, therefore, applicable to all, or even the generality of cases, can, as I conceive, be accurately determined, at which these trees shall have arrived at perfection, as this must differ according to circumstances. Without laying down precise rules, a practised eye will be able readily to decide when a tree is ripe for the axe; in other words, when it has come to its best. There will be no longer any vigorous shoots in the extremities (in woodman's phrase, "no twig,"); but instead, a curling or crinkling of the spray or terminal branches, with scarce any perceptible growth: dead branches or small arms will occasionally be seen towards the top, &c.; and above all, there will be a tightness,—a contraction of the bark on the stem of the tree; *i. e.* the bark, ceasing to expand, will, of course, no longer exhibit those light red or yellow perpendicular streaks in its crevices, which are a certain proof of its expansion, and of the consequent growth of the wood beneath. If the wood-pecker has been busy about a tree, it is a sure indication that it is time, and more than time, to fell it; for this bird never attacks a perfectly sound tree, though often unjustly accused of so doing. But, as already said, an experienced eye will at once perceive the state and condition of a tree, without minutely attending to these and the like particulars.

To the question, "at what age oaks should be cut down, so as to make the best return in point of profit," the answer involves matter of nice and complicated calculation; besides that much will depend on the demand for timber of this or that particular size and quality in each neighbourhood respectively. It is proverbially said that "an oak tree is a good banker;" but I have some misgivings as to the truth of that position. The oak is unquestionably a tree of slow growth; and hence, it is proverbially said again, that "a withy will buy a horse before an oak will buy a saddle." It is held by some as an established maxim, that if an oak were to be cut down when it was worth a pound, and the money put out to interest, it would produce a much larger sum than the tree would sell for when arrived at maturity. This may probably be very true; but then, were such practice universally adopted, it is evident there could be no large timber grown—nothing but mere poles: and what a woful deficiency would ensue of fine ornamental oaks!

The proper management and nursing of timber require some judgment and attention, of course, and more knowledge of the subject, as well as more taste than, perhaps, most proprietors are possessed of. Doubtless, near a man's residence, profit must, in numberless instances, be sacrificed to ornament, shelter, &c. Ancient venerable trees form the noblest appendage to an estate, and one which, indeed, it would be sacrilege to destroy. Trees, too, of extraordinary beauty, or those presenting any remarkable peculiarity of growth or singularity of conformation, should, of course, in all cases, as far as possible, be preserved as curiosities. At the same time, with regard to woods,—woods, I mean, designed principally for profit,—there can be no question but that the prevailing fault with most proprietors is that of being too sparing with the axe, leaving too much and allowing oaks to remain long after they have ceased to remain with profit. A landed proprietor very naturally and properly wishes to encourage the

growth of oak-timber on his estate; accordingly, when a wood is to be cut, directions are given to the bailiff, or perhaps even to a common labourer, carefully to preserve the oaks; and the consequence is, that trees of this kind are spared, time after time, which do not increase one shilling in value by the time the wood comes round to be cut again, a period, it may be, of from ten to fourteen or sixteen years. Now the evil of this system is twofold: first, there is the positive loss to the proprietor of the interest of the money which the trees would have sold for, had they been felled; and, secondly, what is far worse, by allowing them to encumber the ground, a stop is put to a *succession of young trees*, which would have been certain to spring up in their room, according to that just, though homely adage of our provincial woodmen, "cut wood, and have wood." I could point out instances of woods which are absolutely going to ruin for want of thinning, and out of which the present owners might enrich themselves, and at the same time *benefit* their successors.

The subject of a *succession of trees* in woods is not enough attended to. It will perpetually happen, that a thriving tree, one that is "paying money" (as the phrase is), must yet be sacrificed for the sake of some four or five, or perhaps half score, young saplings, which stand around it, and which of course, will be entirely spoiled by the overshadowing branches of their usurping neighbour, if the latter be allowed to remain for another term of ten, twelve or more years. In cases like this, therefore, there is scope for the judgment and discrimination of the woodman; and I admit that it is often not a little painful and perplexing to come to a decision. When a prisoner is put upon trial for his life, the jury are always very properly directed, if they have any doubts as to the guilt of the accused, to give him the benefit of such doubts, and to acquit him. Now the woodman, I conceive, would best consult his interest by acting in a manner the very reverse of the jury; and, as a general rule, if he has any doubts about the propriety of cutting down a particular tree, in cases like the one just mentioned, I believe he will not greatly err (at least, not in the majority of instances) by consigning it to the hands of the feller, reluctant though he may feel so to do.

[Rev. W. T. Bree, in the *Gardener's Magazine*.]

The sperm whale is a gregarious animal, and the herds formed by it are of two kinds—the one consisting of females, the other of young males not fully grown. These herds are called by whalers "schools," and occasionally consist of great numbers; I have seen in one school as many as five or six hundred. With each school of females are always from one to three large "bulls"—they are called the "schoolmasters." The males are said to be extremely jealous of intrusion by strangers, and to fight fiercely to maintain their rights. The full-grown whales almost always go alone in search of food; and when they are seen in company they are supposed to be migrating from one "feeding ground" to another. The large whale is generally very incautious, and if alone he is without difficulty attacked, and by expert whalers very easily killed.—Beale.

Among the various species of trees recently introduced into Egypt, the teak is considered by far the most valuable; it being the opinion of Mr. Traile, the English botanist, that it will thrive there as well as in India. About a dozen seeds having been sent as a present to Ibrahim Pasha from Hindoostan, they were sown in the English garden at Rhouda, towards the close of 1829. Three of them took; and in two years one of the specimens had reached the height of nine feet. A Turkish officer, walking in the garden, happening to observe the straightness and beauty of the tree, thought it would make a good *naboot*, and with one stroke of his sabre levelled it with the ground.—St. John's *Egypt*.

SIR RICHARD ARKWRIGHT.

If any particular species of manufacture has risen to a height which brings honour to the country, wealth to the manufacturers, and comfort to the mass of the people, the man who contributes more than any other to the advancement of that manufacture, is surely worthy of our respect, our admiration, our imitation. The cotton manufacture of England can never be mentioned without reminding us of our obligations to Sir Richard Arkwright.

This benefactor to his country was born at Preston in Lancashire, on the twenty-third of December, 1732. He was the son of poor parents who had twelve other children, the difficulty of supporting whom, made education a very subordinate affair. Young Richard was brought up to the occupation of a barber, in which he continued until about his twenty-eighth year, when he quitted that occupation, and became a dealer in human hair, which he bought in different parts of the country, and then sold to the wig-makers; and he afterwards increased his profits by the application of a mode of dyeing hair.

His first exercise of mechanical ingenuity was an attempt to discover the *perpetual motion*, that quicksand upon which so many ingenious minds have been wrecked*. But he shortly afterwards directed his thoughts to a quarter from which richer fruits might be expected to result, and *did* result. That species of cloth called *calico* (from *Calicut*, a place in the East Indies, from whence it was first brought,) was made, before Arkwright's time, of linen and cotton; that is, the *warp* or long threads were formed of linen, and the *weft*, or cross-threads, of cotton; and the reason for this distribution was, that no means were known at that time by which cotton could be spun to sufficient strength to form the warp or longitudinal threads. The linen yarn for the *warp* was made on a sufficiently large scale to supply all the wants of the manufacturer readily, but the cotton *weft* was very slowly prepared.

The calico-manufacturers used to supply the female cottagers round about the country with linen yarn, and with cotton in the raw state, and they used to card and spin the cotton, and then weave the cloth, —the females doing the former, and the men the latter; and then the piece of woven cloth would be carried home to the manufacturer. Sometimes the females could not spin the cotton so fast as the weaver required it, and he had to trudge from cottage to cottage to obtain a sufficient supply of *weft* for his day's work: indeed the quantity of weft thus made did not amount to a hundred and fiftieth part of what is produced at the present day.

This was the state of things in Arkwright's days, and to remedy it was one of the objects of his attention. He began to form his plan, and looked about him for some one who could assist him in the mechanical details of a new machine. Such a person he found in John Kay, a clock-maker at Warrington, whose services he gained and retained for four or five years; first at Preston, and afterwards at Nottingham. He gave himself up entirely to the prosecution of his new invention, and struggled on in the midst of great poverty, for he had neither friends nor fortune. In 1767, he prevailed on Mr. Smalley of Preston, to afford him pecuniary assistance, to enable him to build a factory; and here he constructed his first machine, which was put up in a dwelling-house attached to the free grammar-school of that town. Arkwright was at this time so poor, that on one occasion during a contested election for Preston, of which he was a burgess, he could not appear at the hustings

* *Saturday Magazine*, Vol. XIII., p. 99.

until after the party for whom he voted had furnished him with a suit of clothes. After a short struggle he was forced to leave Preston, through the violent opposition of the spinners who worked on the old system; and he then removed to Nottingham.

When he arrived at Nottingham, he succeeded in getting the Messrs. Wright, bankers of that place, to advance sums of money to him for the prosecution of his undertaking; but as they found the sums required were larger than they had expected, they ceased to assist him further, but recommended him to the firm of Need and Strutt, of Derby, who had secured a patent for a very ingenious *stocking-frame*. Mr. Strutt examined Arkwright's model of his proposed machine, perceived its excellence, and suggested some valuable improvements; and in 1769, the three manufacturers, Need, Strutt, and Arkwright took out a joint patent for a machine for spinning with rollers.

Arkwright erected his first mill at Nottingham, which he worked by horse-power; but as this moving power was expensive, he built another mill at Cromford, in the parish of Wirksworth, in Derbyshire. This was turned by a water-wheel, in the same manner as Lombe's silk mill, at Derby, and was then called a *water-frame*, and the thread made by it was called *water-twist*.

Arkwright was now a manufacturer, and it has been stated in his praise, that although his early habits and education were little calculated to habituate him to carry on an extensive manufacturing concern, yet he adopted such a judicious method of subdivision and arrangement in his factory, that its excellence has been acknowledged and acted on to the present day, with a very few minor changes; and as such a manufactory never existed before his, from which he might copy, it strongly illustrates the originality of his mind.

The object of Arkwright's endeavours was, as we have slightly hinted, to obtain a strong and continuous thread from cotton, which could not be done by the old cottage method. His spinning frame contained two or more pairs of rollers, one roller being fluted, and the other which worked upon it being covered with leather. The cotton in the form of a thick but very soft cord, was passed between one pair of rollers, and slightly compressed:—then between another pair which revolved with much greater rapidity, and by this means drew the cotton out more and more narrowed.

From time to time Arkwright attentively watched the jenny-spinners in different parts of the country, who were earnestly employed in improving the machines used for carding and roving wool; and many ingenious contrivances were found out to shorten these operations. Mr. Arkwright kept an attentive eye on these contrivances, and by combining a number of them into a series of engines, he formed a complete system of carding and roving by machinery, for which he took out a second patent in 1775. But from this time he was involved in lawsuits of a very extensive and complicated character, arising from the attempts of other parties to avail themselves of the benefits of his ingenuity. In 1781, six years after obtaining the patent, several parties disputed his claim to monopoly, on the ground of some alleged obscurity in the specification of the patent. He brought the matter to trial before the court of King's Bench, and having lost a suit against one of the parties, Colonel Mordaunt, he gave up the rest; by which a number of persons were enabled to work with Arkwright's patented machine.

Thus matters continued for four years, when Arkwright, naturally wishing to reap the fruits of his own ingenuity, in 1785 brought another action, in which he produced witnesses who proved that the description of his spinning-frame, as given in the specification of the patent, was quite clear enough to enable them to make such machines from the description. Arkwright gained the verdict, which spread alarm among a large number of manufacturers, who had established similar machines during the preceding four years. A formidable opposition was raised, the most eminent counsel were engaged, and a new suit was brought by the combined manufacturers against Arkwright, on the plea that a machine, somewhat similar in principle to his, had been known before the specification of his patent. The trial was ably conducted, and a verdict was given against Arkwright, by which the patent was annulled, and the machine made public property.

The legal effect of this verdict did not at all effect Arkwright's honour, for it is now believed that if there were a machine similar to his before his time, he was not aware of it, so that he acted with perfect integrity. The legal features of this question do not interfere at all with the commercial importance of the machine: on the contrary, the very fact of so many persons being eager to avail themselves of Arkwright's ingenuity, is a homage paid to it. Arkwright and his opponent all became enriched by his labours, and a new impulse was given to the cotton manufacture. During the run of the opposition, the other manufacturers refused to buy or use the cotton yarn which he made, and a large stock of it consequently remained on his hands. This stimulated him to new inventions, and he ultimately found means of using up all his yarn in cloths or calicoes of a new and particular kind.

For five years the Cromford mill yielded no profit, but after that, wealth flowed in abundantly. On the occasion of the attempted assassination of George the Third by Margaret Nicholson, an address was presented from the Hundred of Wirksworth by Mr. Arkwright, on which occasion he received the order of knighthood. In 1786, he was appointed High Sheriff of the county of Derby.

Industry, and incessant exercise of ingenuity and skill marked his career till death. From early life he had been afflicted with asthma, and that complaint, joined to some others, brought him to the tomb on the third of August, 1792, in his sixtieth year.

Thus did mechanical ingenuity, and indefatigable exertions, transform Richard Arkwright, the poor barber of Preston, into *Sir* Richard Arkwright, High Sheriff of Derby, with a fortune of not much less than half a million sterling.

One of the most curious and surprising of the actions of the sperm whale is that of leaping completely out of the water, or of "breeching," as it is called. The way in which he performs this motion appears to be by descending to a certain depth, and then making some powerful strokes with his tail, which are rapidly repeated, and thus convey a great degree of velocity to his body before it reaches the surface, when he darts completely out. When just emerged, and at its greatest elevation, his body forms with the surface of the water an angle of about forty-five degrees, the flukes lying parallel with the surface. In falling, the animal rolls his body slightly, so that he always falls on his side; he seldom breeches more than twice or thrice at a time, or in quick succession. The *breech* of a whale may be seen from the mast-head on a clear day at the distance of six miles.—Beale.

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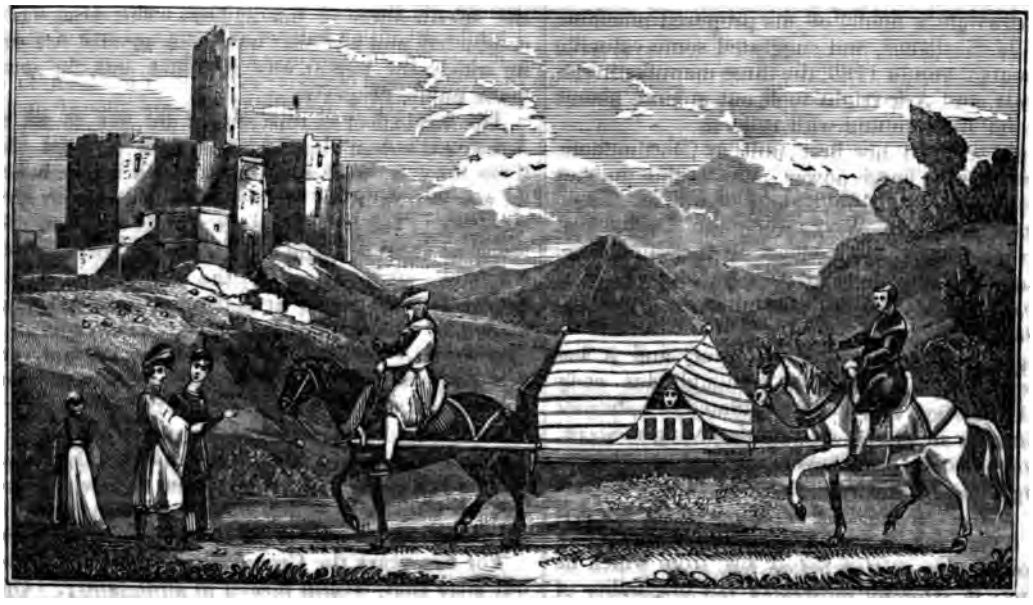
GLANCES AT ENGLISH LAND-TRAVELLING.



TRAVELLING BY HORSE-LITTER, IN THE TIME OF EDWARD THE SECOND.

HAVING, in the Supplement for June, presented a slight sketch of the modes of land-travelling in foreign countries, we will now take a peep at our own isle, and see what have been the principal means of conveyance from place to place at various times. In doing this, we can neither profess to give a treatise on roads, nor a treatise on wheel-carriages; but we shall notice, in chronological order, the most prominent changes and improvements, both in roads and in vehicles.

The primitive mode of land-travelling is, of course, walking; and we may, therefore, reasonably infer that a narrow foot-path was the earliest form of road over dry land; and that stepping stones, a plank, and a rude approximation to a bridge (as in figs. 2, 3, and 4), were the primitive modes of crossing brooks and narrow rivers. This remark applies not only to England, but to almost all countries in the infancy of their civilization.

Fig. 2.

STEPPING STONES.

Fig. 3.

PRIMITIVE BRIDGE.

Fig. 4.

RUSTIC BRIDGE.

One of the earliest modes of conveyance in most countries is riding on horseback, since a very slight amount of mechanical arrangement is all that is required under such circumstances Accordingly, we find that among the ancient Britons, the roads were very little more than pathways, along which a pedestrian or a horseman might travel, but which were not fitted for the reception of vehicles. We have but little intimation of the existence of vehicles among the Britons, except the war-chariots, which were used on the field of battle, and which, having scythes inserted in their axles, were quite as much weapons of offence as vehicles of conveyance.

When the Romans acquired power in Britain, they constructed some of the finest roads which have ever been seen. The object of so doing was principally to afford facilities for the movement of troops from one part of the island to another; but the roads thus made, served for ages afterwards as media of communication for those engaged in internal traffic. Many remains of these roads are to be seen at the present day, and indeed, still serve the purposes of highway roads. At the foot of the present article will be found representations of a British trackway and a Roman road, as presented to our view at the present time. These roads not only traversed England, but were carried northward into Scotland as far as the mouth of the Clyde.

For ages after the departure of the Romans from Britain, nothing new was established either in the way of roads or of vehicles. The horse was the general means of conveyance from place to place, and as a mere path was sufficient for the passage of a horse, there was not great occasion for the construction of wide roads. It seems probable that one of the earliest vehicles introduced into England was the *Horse-litter*, represented in our frontispiece. This was brought from the south of Europe, where

it was found very useful in traversing mountain-ranges, and where it exists to the present day. In those countries mules are the animals employed, but in England, horses were then used, as they now are, for carriages. It will be obvious that a narrow path would suffice for such an equipage, since nothing but the horse's feet touch the ground. That these litters were at times very splendid, is evident from Holinshed's description of the one which was employed at the coronation of Queen Catherine, wife of Henry the Eighth:—"Then came the queen in a litere of white clothe of golde, not covered nor bailed, which was led by two palfreys clad in white damask doone to the ground, head and all, led by two footmen. Over her was borne a canopie of cloth of gold, with four gilt staves and four gilt bells; for the bearing of which canopie were appointed sixteen knights, foure to bear it one space on foot, and other foure another space."

The invention of pleasure-carriages on wheels is claimed by no less than four different nations of Europe; but as England is not one of the four, we will content ourselves with saying that such vehicles appear to have been introduced into this country somewhere about the year 1560. Queen Elizabeth, before that time was accustomed to ride behind her Lord Chamberlain, on horseback, on state occasions. An old writer, who seeems to have viewed the introduction of carriages with an unfavourable eye, says:—"The first coach ever seen here, was brought out of the Netherlands by one William Boonen, a Dutchman, who gave a coach to Queen Elizabeth, for she had been seven years a queen before she had any coach; since when they have increased with a mischief, and ruined all the best housekeeping, to the undoing of the watermen, by the multitudes of hackney-coaches. But they never swarmed so much to pester the streets, as they do now, till the year 1605; and then was the gunpowder treason hatched, and at that time did the coaches breed and multiply." From this doleful lament we learn, that in a few years after the introduction of coaches, they were lent out to hire as hackney-coaches.

The new-fashioned conveyance became quite the rage soon after their introduction; indeed so much so, that some persons in Parliament talked of bringing in a bill to prevent their too rapid increase, lest the government should be at a loss to mount the army, by reason of the extensive use of horses for carriages. About the year 1610, a person in Scotland offered to contract for a certain number of coaches and wagons, with horses to draw and servants to attend them. Accordingly, a royal patent was granted him, conferring an exclusive privilege, for fifteen years, of running between Edinburgh and Leith. This was probably one of the earliest instances of vehicles claiming the character of stage-coaches.

About the year 1620, the Duke of Buckingham, the royal favourite, carried his pomp so far as to have his coach drawn by six horses. A few years afterwards, coaches met with a rival in the shape of *sedan-chairs*. These were introduced by Sir S. Duncombe, gentleman pensioner to James the First, and Charles the First; and he procured a patent, which vested in him and his heirs the sole right of carrying persons in sedans for a certain sum. Sir Saunders was a great traveller, and had seen these chairs at Sedan, from whence they derived their name. As it was about this period that hackney-coaches became prevalent, there were many squibs and jokes current, respecting the comparative merits of the two sorts of vehicles. A pamphlet was written, containing the substance of dispute for precedence between a coach and a sedan:—a brewer's dray, or "beere-cart," being the umpire. The two combatants are described: the coach being "a thick, burley, square-sett fellow, in a doublet of black leather, brasse buttoned downe the breast, back, sleeves, and winges, with monstrous wide bootes fringed at the top with a net fringe, and on the back an atchievement of sundry coats in their proper colours":—the other, the sedan, was "in a suite of green, after a strange manner, windowed behind and before with isinglasse, having two handsome fellows in green coats attending him; the one ever went before, the other came behind. Their coats were laced downe the backs with a green lace suitable; so were their half-sleeves; which persuaded me at first they were some cast suites of their master's. Their backs were harnessed with leather angles cut out of a hide as broad as Dutch collops of bacon." After *each party had pleaded* his superiority over the other, the *umpire came to a decision* not likely to satisfy either of *them*:—"*coach* and sedan, you both shall reverence and ever give way to beere-cart, wherever you shall meete him, either in citie or countrie, as your ancient and elder brother."

The curious views which were taken as to the advantages and disadvantages of travelling in the seventeenth century, may be illustrated by a pamphlet which was published in 1672, in which the author urged the propriety of suppressing stage-coaches, of which, however, there were but six in the kingdom. He says;—"These stage-coaches make gentlemen come to London on every small occasion, which otherwise they would not do, but upon urgent necessity; nay, the convenience of the passage makes their wives often come up, who, rather than come such long journies on horse-back, would stay at home. Then when they come to town, they must presently be in the mode, get fine clothes, go to plays and treats, and by these means get such a habit of idleness and love of pleasure, as makes them uneasy ever afterwards."

The passage of stage-coaches from one town to another could not, of course, continue without frequent formation and improvements of roads; and as these improvements became more numerous, it was necessary to devise a means of paying the expenses thereby incurred. Accordingly about the year 1663, an act was passed, authorizing the erection of turnpike-gates on certain roads then being made or repaired, and the charge of a toll for every vehicle which passed through those gates. This law, like most new enactments, was not at all relished by the populace; they used to obstruct the taking of the toll at the gate-houses, and ultimately to destroy the gates themselves: this rendered necessary the infliction of severe penalties against the violators of the law, and at length the improvement of the high-roads gradually reconciled the people to the payment of the toll demanded.

With respect to the commercial principles on which the making and preserving of roads have generally been conducted in this country, we may quote the following remark of a distinguished writer.

"It is owing to the turnpike system of road management that England is so superior to other countries with respect to her public roads. The legislature, by giving powers to persons willing to come forward as subscribers, commissioners, or trustees, and act together for the purpose of making new roads, or improving old ones, adopted the wisest principle for securing an abundance of good roads. Had the legislature refused to incorporate those persons who have executed the duties of turnpike trustees, and given the management of the roads to the government, or left them wholly with the parishes, this country could never have reached the degree of wealth and prosperity to which it has arrived, for want of proper means of inland communication. It must be quite clear to every one who has carefully examined this subject, that nothing but leaving the management of the roads to those persons who live in their neighbourhood, would ever have induced the people of England to pay, as they now do, a road-revenue, arising from turnpike tolls, to the amount of one million, two hundred thousand pounds a year; for although tolls are in every respect fair and proper for maintaining a road, and although government, by employing scientific engineers, might have extended the produce of them with greater skill than country gentlemen, the hostility to pay them, if they had been wholly at the disposal of government, would no doubt have prevented the making of useful roads so universally over the whole country as they have been made under the established system. It should be remembered, that turnpike-roads owe their origin, in many instances, to private subscriptions of considerable amount; and, in every such case, the main inducement to subscribe must have been the intrusting of the management of the funds to the subscribers, and giving them corporate powers. The same principle of association has led to the making of the canals, the docks, the great bridges, and all the most useful public works of the country; and it is not conceivable how such large funds for making new roads, or for converting parish-roads into turnpike-roads, could have been obtained as have been obtained, if the legislature had not acted on this principle."—Sir H Parnell.

We have said that hackney-coaches increased rapidly in number soon after their introduction; so much was this the case, that an order in council was issued in 1635, limiting the number to fifty, to each of which might be kept twelve horses. In 1652 the number was increased to 200 coaches, and in 1654 to 300, and again in 1661 to 400, for each of which 5*l.* per annum for a license was charged.

As to the cost of coaches at these times, the following entry in Sir William Dugdale's *Diary* gives us some information:—"1681.—Payd to Mr. Meares, a coachmaker in St. Martin's-lane, for a little chariot, which I then sent into the countrie, £23 : 13 : 0; and for a cover of canvas, £01 : 00 : 00; also, for harness for two horses, £04 : 00 : 00." As to the speed of travelling, our readers are prepared to expect that it differed most materially from what we now find it. To take a journey only from Birmingham to London was considered a sufficiently hazardous event for a solemn leave-taking of family and friends, notwithstanding an advertisement concerning that remarkably swift-travelling coach, the "Fly, which leaves Birmingham on Monday, and reaches London on the Thursday following!" What would our ancestors have thought of breakfasting at Birmingham and arriving in London in time for an early dinner, as we can now do?

We often meet with ludicrous accounts of the perils and dangers attendant on travelling, before the high-roads were brought to their present condition. When Charles the Third of Spain visited England, and Prince George of Denmark went out to meet him, both princes were so impeded by the state of the roads, that their carriages were obliged to be borne on the shoulders of the peasantry, and they were six hours in performing the last nine miles of their journey. One of the attendants thus describes the journey.—"We set out at six o'clock in the morning to go for Petworth, and did not get out of the coaches (save only when we were overturned or stuck fast in the mire,) till we arrived at our journey's end. It was hard service for the prince to sit fourteen hours in the coach that day without eating anything, and passing through the worst ways I ever saw in my life: we were thrown but once indeed in going, but both our coach, which was the leading, and his highness's body-coach, would have suffered very often, if the nimble boors of Sussex had not frequently poised it, or supported it with their shoulders from Godalmin almost to Petworth; and the nearer we approached the duke's house, the more unaccessible it seemed to be. The last nine miles of the way cost us six-hours' time to conquer them; and, indeed we had never done it if our good master had not several times lent us a pair of horses out of his own coach, whereby we were enabled to trace out the way for him."

A letter, written in 1673, says,—"Honoured father, my dutie premised, &c. I got to London on Saturday last: my journey was noe ways pleasant, being forced to ride in the boote all the way. Y^e company y^t came up with mee were persons of great quality, as knights and ladies. My journey's expence was 30*s*. This travel hath soe indisposed mee, y^t I am resolved never to ride up again in y^e coatch."

As an instance of the slow and tedious travelling of those times, we may adduce the fact, that the abdication of King James the Second was not known in the Orkneys until *three months* after the event took place. A writer, a few years back, speaking of some events which occurred in the seventeenth century, says,—"At this time the communication between the north of England and the Universities was kept up by carriers, who pursued their tedious, but uniform, route with whole trains of pack-horses. To their care were consigned not only the packages, but frequently the persons of young scholars. It was through their medium also that epistolary correspondence was managed; and as they always visited London, a letter could scarcely be exchanged between Yorkshire and Oxford in less time than a month."

When the Duke of Somerset, at a much later period, was accustomed to travel from London to Petworth, he used to send a letter previously, requesting that "the keepers and persons who knew the holes and the sloughs, must come to meet his grace with lanthorns and long poles, to help him on his way."

It appears that, during the period of which we have been lately speaking, long and cumbrous wagons or caravans were employed for the conveyance of the humbler classes from town to town. They were drawn by four or five horses, and carried from twenty to twenty-five passengers.

Mr. Macculloch, in speaking of roads as they existed a century ago, remarks:—"Roads were then hardly formed, and in summer not unfrequently consisted of the bottoms of rivulets. Down to the middle of the last century, most of the goods conveyed from place to place in Scotland, at least where the distances were not very great, were carried, not by carts or wagons, but on horseback. Oatmeal, coals, turf, and even straw and hay, were conveyed in this way. At this period, and for long previous, there were a set of single-horse traffickers (cadgers) that regularly plied between different places, supplying the inhabitants with such articles as were then most in demand, as salt, fish, poultry, eggs, earthenware, &c.; these were usually conveyed in sacks or baskets, suspended one on each side the horse. But in carrying goods between distant places it was necessary to employ a cart, as all that a horse could carry on his back was not sufficient to defray the cost of a long journey. The time that the carriers (for such was the name given to those that used carts) usually required to perform their journeys seems now almost incredible. The common carrier from Selkirk to Edinburgh, *thirty-eight* miles distant, required a *fortnight* for his journey between the two places, going and returning! The road was originally among the most perilous in the whole country: a considerable extent of it lay in the bottom of that district called the Gala water, from the name of the principal stream; the channel of the water being, when not flooded, the track chosen as the most level and easiest to travel in."

In the year 1678 an agreement was entered into, by which a person engaged to run a coach between Edinburgh and Glasgow, (a distance of forty-one miles,) which was to be drawn by *six horses*, and to perform the journey from Edinburgh to Glasgow and back again in *six days*. Even so late as the middle of the last century, it took a day and a half for the stage-coach to travel from Edinburgh to Glasgow, a journey which is now accomplished in four and a half or five hours, and which, when the railway is constructed between the two towns, will be done in less than two hours. So late as 1763 there was but one stage-coach from Edinburgh to London, and it set out only once a month, taking from twelve to fourteen days to perform this journey! At present, notwithstanding the immense intercourse between the two cities, by means of steam-packets, smacks, &c., six or seven coaches set out each day from the one or the other, performing the journey in from forty-five to forty-eight hours. But it is probable that the number will be decreased as railroads become gradually completed; and passengers have already begun to avail themselves, for part of the journey, of some of the railroads now open.

We had occasion to allude, a few paragraphs back, to the tardy and uncertain mode of conveying letters from Yorkshire to Oxford, in the early part of the seventeenth century. A great commercial nation could not carry on its internal communication by such imperfect means as these, and consequently there was gradually established a system of post communication throughout the kingdom. It was about the year 1654 that a regular post-office system was established, and the conveyance of letters from place to place was managed by post-boys on horseback, or else by single-horse carts. However, in the year 1784, Mr. Palmer, afterwards comptroller-general of the post-office, devised a new plan, which he recommended to government, as being calculated to increase the revenue and to accommodate the public, who had previously been subject to many robberies and delays under the old system. His proposal was acceded to, to the advantage of himself as an individual, and to the nation generally. His plan was, to provide a certain number of coaches of light construction, and each to be adapted to carry the various bags or packets of letters, which were destined for a particular part of the country or line of road. The property and profits of the post, or conveyance of letters, are vested in Government, which contracts with the proprietors of coaches for the carriage of the mail.

This mode of conveyance has received many improvements from time to time during the fifty or sixty years that it has existed. An improved breed of horses,—improved construction of coaches,—a greater economy of time,—and, above all, improvement in roads,—have all tended to the celerity of the post. The rate at which the mail was undertaken to be conveyed was fixed on the best roads at about eight miles per hour; but it has lately far exceeded that. A writer in the *Quarterly Review*, about six years ago, observes:—"Thirty years ago, the Holyhead mail left London, *viâ* Oxford, at eight o'clock at night, and arrived at Shrewsbury between ten and eleven the following night, being 27 hours to 162 miles. This distance is now done, without the least difficulty, in 16½ hours; and the Holyhead mail is actually at Bangor Ferry, eighty-three miles further, in the same time it used to take in reaching the post-office in Shrewsbury." Again, speaking of the Edinburgh mail, the same writer observes, "The Edinburgh mail runs the

distance, four hundred miles, in forty hours, and we may set our watches by it at any point of our journey. Stoppages included, this approaches eleven miles in the hour, and much the greater part of it by lamplight." As an illustration of the comparative rapidity of English and French mail travelling, it is stated that the distance from London to Exeter is about the same as that from Calais to Paris, namely, 173 miles, that the time allowed for the English mail is eighteen hours, while that for the French is twenty-eight or thirty, and is then considered good work; that in the stage-coaches the disparity is still greater, the Exeter day-coach, the "Herald," requiring but twenty hours, while the Paris and Calais coach requires from fifty to sixty, according to the state of the weather and of the roads.

A year or two ago there were fifty-four four-horse mails, and forty-nine pair-horse, in England; ten four-horse, and four pair-horse, in Scotland; thirty four-horse, and five pair-horse, in Ireland. Since that time the opening of several railways has occasioned changes and improvements in the management of the mails; and we will venture to express a hope that a change in the rates of postage will before long occasion still greater changes; but this is a subject which does not come within the province of our work to discuss.

Most of the observations which we have applied to mail-coaches will, of course, apply to some extent to stage-coaches also, so far as they are vehicles intended to carry passengers rapidly from place to place. Improvements have been made from time to time in both these kinds of vehicles; and the annexed cut, (fig. 5,) will remind the reader of the modern appearance of the mail-coach. The

Fig. 5.

MAIL-COACH.

same circumstances which have led to the improvement of mail-coaches, have operated equally on stage-coaches; *viz.*, good construction, good horses, good system, and, above all, good roads. Even when good roads exist, a quick pace cannot be attained unless the other points be attended to,—for instance, the road from Shrewsbury to Chester was a good hard road thirty years ago, and yet a stage occupied *twelve* hours in going the distance, forty miles,—the same distance being now gone over in less than *four* hours. The condition and treatment of the horses is now found out to be more important than used to be supposed, and the best coaches have nearly as many horses belonging to them as the number of miles between the two extremes of their journey. The extent to which stage-coach travelling has arrived almost exceeds belief. Twelve years ago, it was calculated that a person had 1500 opportunities of leaving London in the course of the twenty-four hours, by stage-coaches, and that three hundred stage-coaches passed through Hyde-Park-Corner daily. Extensive as is this amount of intercommunication, it must be obvious to all, that a vast increase has taken place within the last twelve years, exclusive of that extensive traffic through the streets of London by means of omnibuses, &c.

It is manifest at once, that improvements in roads must be simultaneous with improvements in vehicles; for there would soon be a limit to the power of the latter, were not the roads made fit for their reception. Accordingly, road-making has sprung up into a science within a few years, and has engaged the attention of Sir H. Parnell, of Messrs. M'Adam, Telford, Walker, M'Neill, Stephenson, and others of our best engineers. Under the direction of these individuals some magnificent roads have been formed within a few years, in which attention has been paid to four or five important points:—first, judicious choice of direction with reference to hills and valleys:—second, cutting down elevations and filling up hollows, in order to have no steep ascents:—third, a careful selection not only of the materials *of the road, but also of* the foundation on which those *materials are laid*:—*fourth*, the choice of such a degree of convexity for the road, that while on the one hand, rain-water shall drain off to the sides, the convexity shall, on the other hand, not be such as will endanger the safety of vehicles:—and fifth, a provision for carrying off the water which drains from the road to the channels at the sides. All these are points which now engage the attention of the scientific road-maker; and their practical application is nowhere more visible than in the beautiful road which Mr. Telford constructed through Wales to Holyhead. The tunnel and excavation through Highgate Hill is another instance of skill and labour applied to the furtherance of a quick and easy means of conveyance from place to place.

We may consistently present a brief view of the point of difference between the system of road-making introduced by Mr. M'Adam and those which were in operation previously. Mr. M'Adam proceeded on the principle, "that a road ought to be considered as an artificial flooring, forming a strong, smooth, solid surface, at once capable of carrying great weights, and over which carriages may pass without meeting any impediment."

Supposing an old road to be about to be repaired, and that there were not a sufficient supply of stones upon it for the required purpose, he directed that more stones should be brought, and that the whole of them should be broken up into pieces not exceeding six ounces in weight. The road is then to be laid as flat as possible, leaving only a fall of three inches from the middle to the sides, when the road is thirty feet wide. The stones are to be loosened from the road, and dragged to the side and broken, together with what new stone may be required.

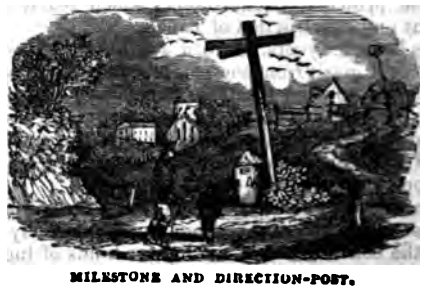
After the ground has been prepared for the reception of the broken stones, they are then carefully spread over it; this operation requires very particular attention, and the future quality of the road will greatly depend on the manner in which it is performed; the stone must not be laid on in shovels full, but scattered over the surface, one shovel full following another, and being spread over a considerable space. Such are some of the instructions given by Mr. M'Adam.

In some circumstances he found it not advisable to take up and break the old stones, when repairing a road. For example,—the road betwixt Bath and Cirencester was made of large stones, but so friable, that in taking them up, or *lifting*, as it is technically called, they would have fallen into sand. In this case Mr. M'Adam merely had the higher parts cut down and replaced when sifted, and the surface kept smooth until those materials were gradually worn out; and they were afterwards replaced by stone of a better quality, properly prepared. On another occasion, when repairing the high-road at Egham, it was found necessary to remove the whole road, in order to separate the small portion of valuable materials from the mass of soft matter in which they were enveloped, and which was carried away, at a considerable expense, before a good road could be made.

These are some of the principles on which Mr. M'Adam commenced his operations on roads, and the application of which has been visible through such a large extent of streets and roads within the last few years.

The erection of *mile-stones* and *direction-posts* (fig. 6) along the margin of public roads, is not to be included among recent improvements; for it is probable that soon after turnpikes were established on the high-roads, the convenience of travellers was consulted by placing direction-posts at the point of meeting of two or more lines, and mile-stones along the side of the road. These conveniences must have been much more valuable in the infancy of stage-coach travelling than they are now.

Fig. 6.



MILESTONE AND DIRECTION-POST.

Of the importance of good roads and convenient vehicles to the well-being of the commercial interests of a country,

need be said, as it must be obvious to any one who ows a little consideration on the matter. The following ance may serve to illustrate this point:—It has been d that some years ago, probably towards the end of last century, the only means of going from Horsham ussex, to London, was either on foot or on horseback, latter mode not being practicable at all seasons of the , nor in every state of the weather; and that the roads e never at that time in such a condition as to admit of p or cattle being driven to the London markets. What the consequence? The farmer could not convey his k to a good market, and was thus forced to dispose of his own immediate neighbourhood; so that the quarter fat ox was frequently sold for fifteen shillings, and l mutton had to be sold for five farthings per pound. is perhaps an extreme case, but it will serve to illus- the ruinous check put to industry and commercial rprise for want of internal communication between rent towns. So well aware are the legislature and the ntry generally of this truth, that every year adds some- g to the length of turnpike-roads in England, which at present time amounts to not less than *twenty-five usand miles*.

efore we leave the subject of stage-coaches, we may , that such have been the improvements in their con- ction, in their general appearance, and in the horses loyed in them, that gentlemen of fortune have taken a ght in driving them. The Brighton road witnessed an nce of this, in the late Mr. Stevenson, who, though an mplished gentleman, used to pride himself on driving of the Brighton coaches. At a certain part of the , his own servant used to hand a silver sandwich-box d to the passengers, to each of whom was also handed lass of sherry. Two other gentlemen of fortune have said to have followed the same course on the same . We are not called upon to comment upon this, or to ress our individual opinion as to the fitness of the em- ment to the station of a gentleman; but we mention circumstance as illustrative of the elegance and spirit h everything connected with the best stage-coaches presents.

here can be scarcely a greater contrast between two cles than between those which we have been describing, the wagon, (fig. 7.) The latter is associated in our ds with all that is heavy and clumsy: the enormous ht to which the luggage is built—literally built up:— great width and solidity of the wheels:—the bulky nsions and muscular strength of the eight horses, and slow pace at which the whole equipage moves, seem very reverse of all that we look for in a stage-coach.

Fig. 7.

WAGON ON THE GREAT WESTERN ROAD.

re are many reasons why heavy wagons are not likely to retain their position in the commercial machinery he country. Their extreme slowness of pace is a great nvenience in a commercial point of view, and this was of the principal circumstances which led to the esta- ment and construction of canals.

anals have, for years, afforded a valuable means of trans- for heavy goods from one part of the country to another, railways now bid fair to produce a still greater change odes of conveyance. Railroads now form a subject of a vast importance, that we cannot venture to include a ce of them in this article: we intend to devote a sepa- Supplement for their consideration.

While speaking of wagons, we may just allude to the -horse vans, which have been found extremely conveni- for the convenience of the lighter kinds of luggage, as travel more than twice as fast as the heavy wagons. these are likewise destined to be influenced by the ways, which will in a few years intersect every part of land.

Having thus taken a general view of the modes of conveyance from one part of the country to another in by-gone times, we must now conduct our readers through the streets of some of our great cities—London for instance—and take a glance at the very various modes of conveyance for short distances which are to be found in London. These modes of conveyance may be divided into three classes, viz.—1st, private vehicles belonging to the wealthy classes,—2nd, public vehicles performing stated journeys at stated times,—3rd, public vehicles for hire at all times, and to take any route. We shall consider them in this order, and shall illustrate our description, when necessary, by wood-cuts.

First and foremost among the private vehicles belonging to the wealthy classes, is the magnificent royal state-coach, of which fig. 8 is a representation. This coach has served for four English sovereigns, on all the state occasions when etiquette required such a mode of conveyance.

Fig. 8.

ROYAL STATE-CARRIAGE OF ENGLAND.

This coach was built in the year 1762, and is therefore now nearly eighty years old. It was designed by Sir William Chambers, and executed under his direction; the carving being executed by Wilton, the painting by Cipriani, and the other parts of the workmanship by the best in their several trades. An account has been handed down of the original cost of the coach, which we will here transcribe.

	£.	s.	d.
Making	1673	15	6
Carving	2504	0	0
Gilding	933	14	6
Painting	315	0	0
Lace	737	10	7
Chasing	665	0	0
Harness	385	15	0
Mercery	202	5	10
Bits	99	6	0
Millinery	30	4	0
Sadlery	107	13	0
Cover, &c.	7	13	0
	7661	17	5

It will be seen, therefore, that it was a very costly affair, and it is unquestionably a very tasteful one. The body of the carriage is surported by four Tritons, two before and two behind: the foremost two likewise support the driver's seat, and are represented blowing into conchs or shells. The coach-pole is made to represent a bundle of lances. The form of the body itself is that of eight palm-trees, which, branching out at the top, support the roof. In the centre of the roof are three figures, representing the genii of the three kingdoms, and supporting various articles of the regalia. It need scarcely be said that the interior fittings, and all the minuter details, fully correspond with the beauty of the general form.

It is somewhat remarkable that the only other coach in England which can at all bear comparison with the royal state-coach, viz., the Lord Mayor's coach, was built about the same time, and is, like it, three quarters of a century old. It was about the year 1712 that the Lord Mayor first rode in a state-coach, to the water-side, in his way to Westminster, on the ninth of November. For more than two centuries before that period, the civic cavalcade went on horseback. The state-coach employed, which was first drawn by four horses, and afterwards by six, lasted till about the year 1757, when a subscription was raised among the aldermen for defraying the cost of the new coach, which is the one now in use. It is perhaps not fully equal to the royal coach in elegance of design, but it far eclipses everything else of the kind known in England.

To descend now from state-coaches to those of private use,

dividuals, we find that the most complete is that called a town-coach or carriage. This coach, like a stage-coach, has two seats inside, and the coach-box is covered with that kind of drapery called a hammer-cloth. These coaches are also generally so contrived, that when they are used for travelling, the hammer-cloth seat can be removed, and its place supplied by a simpler seat for the driver, and a place beneath for the reception of luggage.

That form of carriage which is known by the name of a *chariot* may be considered as half a coach; for the general form and appearance resemble those of a coach, except that the body only contains one seat, there being no persons seated with their backs to the horses. This is likewise the form of the hired vehicles called *post-chaises*. These being intended for quick travelling rather than to hold many persons, they are built very light, and have only one seat inside. To render them still lighter, there is no coach-box, as the driver generally sits on one of the horses. But to return to private vehicles:—

Landau is the name given to a double-seated coach, which has a provision for being made into an open carriage, by means of a jointed head. These carriages are not now much used, partly from their heavy form of construction, and partly from their liability to get out of order.

As a landau is a coach which may be opened, so is a *landaulet* a chariot, with a similar convenience for opening. But the landaulet, like the landau, is now superseded by other forms of vehicles.

Most of these carriages, and one or two others, come under the denomination of *close carriages*. There are several other kinds, which have the general name of *open carriages*, all of them, like the former, having four wheels; such as the barouche, the barouchet, the britzschka, the droitzschka, the phaeton, and some others.

A *barouche* is a sort of a coach without a roof. There are no means of closing in the vehicle over-head, so that it is only calculated for using in the finest weather—a circumstance which has led to the substitution of other vehicles in lieu of it. There are two seats in a barouche, but there is no place for a servant behind.

The *barouchet* is a small barouche, having one seat instead of two, and is a form of vehicle very seldom used at the present day.

The next two forms, the *britzschka* and the *droitzschka*, (or drosky) are importations from abroad, having only been used in England within a few years. Their great convenience has led to an extensive employment of them. The annexed cut (fig. 9) represents a britzschka. This form was brought from Germany about a dozen years ago. The body of the vehicle only contains one seat, but there is generally a *boot* behind, capable of accommodating two persons. Although the body contains but one seat, and will hold but two persons when it is closed in, yet there is accommodation

Fig. 9.

BRITZSCHKA.

for four persons when, in fine weather, some slight adjustment is made in the front of the vehicle. One of the chief recommendations of the britzschka is, that the inmates can recline at full length at pleasure. This is a degree of ease and comfort which none of the old carriages would admit. It is generally driven by a person sitting in the body of the carriage, but the front trunks may be removed, and a driver's seat erected in front. The awning or covering over the heads of those inside admits of being completely closed in, by means of a kind of glass door or window let down in front.

The other foreign name which we lately used—*droitzschka*, (rather perplexing to an Englishman,) is applied to a vehicle much used at the present day in Russia, particularly at the two capitals, St. Petersburgh and Moscow. The rider sits across a pole or perch, in a very inelegant manner; but the droitzschkas used in England more resemble other private vehicles. Their principal characteristic is that the passengers are seated very low, their feet being only a few inches from the ground; which makes the carriage a very convenient one for invalids.

The *phaeton* is a form of vehicle very convenient for many purposes, as there are two seats, one behind the other, so that a servant can either sit on the front seat and drive, or occupy the hinder seat, as may be preferred. The annexed cut (fig. 10) represents an old-fashioned phaeton, which has

Fig. 10.

OLD ENGLISH PHAETON.

now given way to other forms; and indeed phaetons altogether have been nearly superseded by britzschkas. The lightest and simplest form of phaeton is that which is called a *pony-phaeton*, and which is frequently driven by ladies, in parks and pleasure-grounds.

There are several other forms of four-wheeled carriages, but we will not stop to enumerate them, as we wish to say a few words respecting two-wheeled vehicles, which are very much used where only one or two persons wish to ride in them.

Fig. 11.

CABRIOLET.

Figures 11, 12, and 13, represent three forms of two-wheeled carriages,—the *cabriolet*, the *gig*, and the *tilbury*. The cabriolet, as well as the name which is applied to it, were imported from France. This vehicle is only made to contain two persons, but it has a head which can be either opened or closed according to the state of the weather, and by means of the apron in front, the riders can be almost entirely sheltered from the weather.

Fig. 12.

GIG.

The *gig* is one of the very lightest wheel-carriages in use. Every means are adopted to render its construction simple; in fact, it is very little more than a railed chair fixed on shafts. The use of the gig is much less frequent than it used formerly to be.

Fig. 13.

TILBURY.

s *tilbury* was named after the person who first in-
d it, and has a light appearance; but it is said by
ical persons to be in reality a heavy vehicle, on account
s iron-work necessarily employed in its construction.
her two-wheeled vehicles are the *curricle*, the *stan-*
and the *dennet*, which more or less resemble those
we have described above. The curricle, however,
s from the others in being the only two-wheeled vehicle
g two horses a-breast. The horses have a bright steel
assing across their backs, from which is suspended a
passing between the two horses and attached to the
ige: by this pole the carriage is drawn along. The
ope bears a considerable resemblance to the tilbury,
es the dennet to the phaeton, so we need not further
ularize them.

us numerous, then, are the forms of vehicles employed
e wealthy classes in this country; perhaps there is no
country in which the forms are so very various, con-
ng that nearly the whole of these are employed in the
streets of London.

th regard to the second of the three classes into which
vided metropolitan vehicles, namely, those which make
te journeys at definite times, we need not say much
dition to what we have already observed. This class
rises *stage-coaches* and *omnibuses*. There have been
oveltie introduced to public notice within a few years,
have so rapidly gained a footing as omnibuses. It

Fig. 14.

OMNIBUS.

a very few years ago that a Paddington stage-coach
ietor brought the idea from Paris, and established om-
es on the Paddington road. We believe that he was
d by the speculation, as often happens in such cases;
he extraordinary increase in the number since that
l sufficiently indicates that the mode of conveyance is
led with great conveniences, notwithstanding numerous
s which are often complained of in the system on
they are conducted. The circumstances which
r to have led to the extensive use of these vehicles
robably these:—that they are easy of ingress and
s; that they can be met with at every hour, and almost
minute, of the day; that they traverse London in
t every direction; and that the charge is uniform and
mely moderate. Every one of these points is of im-
nce to the inhabitants of a busy, trading city; and it
he combined effect of all that we attribute the asto-
ng fact of considerably more than a thousand of these
les being employed in and near London, not only
day, but nearly all day long. As to the name itself,
n only suppose that it is derived from the Latin word
us, "for all."

ge-coaches working in and through the metropolis
decreased in number since the great increase of om-
es. But both are under the influence of the stamp-
and have a specified number of journeys which they
m every day; any increase in the number of journeys,
the distance of each journey, being subject to an
ional tax. It is from this circumstance that principally
the regularity and fixedness of the hours of most of
age-coaches and omnibuses.

e last class of metropolitan vehicles, (and we apply
marks to many other large towns besides the metro-
) consist of those which can be hired at all hours, for
clusive use of the persons hiring, to go to any part
town or its environs, and to devote any number of
to the journey. This class chiefly consists of *glass-*
es, *hackney-coaches*, and *cabriolets*, or "cabs," as they
lled for brevity. Glass-coaches are a kind of private
kept by persons who let them out generally for the
half-day; and they are considered a grade higher in
than hackney-coaches. As to their mode of con-
ion, nothing need be said here, as they resemble the
coaches, chariots, landaus, &c., before spoken of, except in being less ornamental and costly.

Fig. 15.

HACKNEY-COACH.

Few things in London are better known than hackney coaches, (fig. 15) hackney-coachmen, and we may say hackney-coach horses. The coaches are often crazy vehicles, which, having seen their best days in private hands, wear out the rest of their strength as hired vehicles. The coachmen form a class almost peculiar among themselves, and have been the burden of many a song—a joke—and a picture. As to the poor horses, the less we say about them the better.

Fig. 16.

HACKNEY CAB.

If omnibuses have had a more rapid increase than any other form of vehicle, *cabriolets* have undergone a greater change of form since their introduction. In the first form, after they were introduced from France, the driver sat with the fare, on the same seat: in the next form, a little seat or "dicky" was made for the driver on the outside of the body of the vehicle, as in fig. 16. Both these forms having been found extremely unsafe, there were then numerous contrivances for improving the form; in one case, the driver sat immediately over the fare, instead of at the side; in another case behind. Then came the plan of making them close vehicles, more or less resembling a hackney-coach; some with the driver sitting in front, others seated on the roof; some with two wheels, others with four. All these various forms must be familiar to those of our readers who are resident in, or visitors to, the metropolis.

Fig. 17.

WATERING CART.

This seems to be the proper place in which to introduce a notice of an invention of considerable ingenuity which has been brought under the attention of the public within two or three years by Mr. Adams, and described in his *History of English Pleasure Carriages*. We allude to the adoption of *equirotal* or *equal-wheeled carriages*. It is a fact familiar to all our readers, that in almost all our four-wheeled carriages, the front wheels are smaller than the hinder. The object of this discrepancy in size is to enable the carriage to turn round a corner. The front wheels are so arranged as to be capable of turning round a central pivot, and to effect that turning is the first step in turning the carriage itself in a different direction from that which it before occupied.

Now in order that the front wheels should so turn on a centra. pivot, it is necessary that they be brought altogether in *front* of the carriage, so as to turn without in any way interfering with it, or else that they be so small as to turn *beneath* the carriage. In practice the latter plan is observed, and therefore the front wheels are made smaller than the hinder ones.

Whoever has paid the slightest attention to mechanical subjects, knows that friction greatly retards the motion of bodies; and in wheel-work the friction of axles is an important item. Now the smaller the diameter of a wheel rolling along the ground, the greater is the friction of the axle during a journey of a given extent, because the wheel has to revolve on its axle an increased number of times. It is to obviate this increase of friction that Mr. Adams proposes the adoption of equal-sized wheels; and, in order to effect this, he makes certain changes in the form of vehicles, so that the front wheels shall not have to pass *under* the carriage while turning. The principle on which Mr. Adams has proceeded is to make a kind of vertical pivot or hinge between the front and hinder wheels, so that, in fact, the whole carriage consists of two parts, connected to each other only by a hinge, round which they could turn, because each part has two wheels affixed to it.

The first equirotal carriage thus made was a phaeton, which, according to Mr. Adams' account was drawn with much greater ease to the horse than an ordinary phaeton of similar form and weight, and produced none of the unpleasant rumbling noise common to ordinary carriages.

Fig. 18.

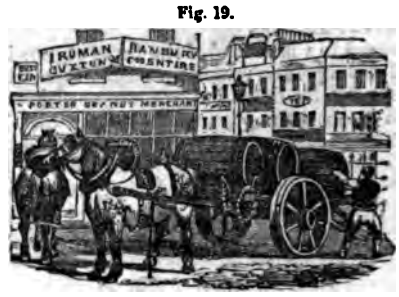
PAVIORS.

The inventor then proceeded to apply the same mode of construction to cab-phaetons, droitzschkas, chariots, and other forms of private carriages. Lastly, he applied it to the construction of omnibuses, in which, as the whole vehicle is closed in, the separation into two parts, one connected with each pair of wheels, would not be advantageous; he therefore proposes that the omnibus should be jointed in the middle, with flexible sides or coverings for the joints, made of leather. Mr. Adams thus enumerates the advantages of the construction:—"It will turn with facility in the narrowest streets, without impeding the passage-way along the interior, as the flexible sides move in a circle. With this omnibus two horses would do the work of three; there would be great facility of access and egress; perfect command over the horses; increased ease to the passengers; greater head-room, and more perfect ventilation; greater general durability, and absence of the usual rattling noise, accompanied by entire safety against overturning. This design is calculated for the accommodation of twelve inside passengers, but it might easily be lengthened to hold twenty; and two horses would draw it with the same facility as fourteen are drawn on the present plan, on account of the height of the wheels, which so much aids the draught."

The reader will understand that we are expressing no opinion on the merits of this invention beyond its ingenuity; but we have thought it right to give a slight notice of it in this place.

From the details which have lately occupied us, it appears, then, that among the proofs of the vastness and commercial wealth of the metropolis, the means of travelling from place to place are by no means to be left out of view. We have no means of knowing the total number of vehicles employed for the conveyance of persons (we leave out all mention of carts and other means for the conveyance of goods) in London; but it is plain that they must amount to several thousands, even those which are hired by the public, without mention of those belonging to private individuals.

Fig. 19.



DRAY.

The constant traffic of so many thousand vehicles through the public streets renders it a matter of importance that the roadways should be kept in good order; and the degree of attention paid to this point may be instanced by the fact that the paving of a single street in London (Oxford-street) with granite, according to the improved plans of modern engineers, has been estimated at considerably over twenty thousand pounds. Whether this mode of paving will be adopted, is a question left open until the result of certain experiments on the durability of different kinds of roads shall have been made; but we mention the circumstance as illustrative of the high importance attached to the preservation of good paved roads in the metropolis. These experiments were resolved on a few months ago. As many as ten or twelve different kinds of paving were laid down: some consisting of granite blocks, both with and without cement:—others consisting of various kinds of bitumen and asphaltum, laid down in different forms and of varying thickness; lastly, a novel paving of oak-blocks was laid down, consisting of pieces of a pyramidal shape, with the apex of each block placed downward. About the month of April last, the various specimens of paving (which are at the east end of Oxford-street, were examined; but it was determined to give most of them a further trial before a decision should be arrived at.

Figs. 17, 18, and 19, will remind our London readers of scenes which are very frequently presented to their view, and with these we must conclude. In a future Supplement we propose to treat of the important subject of Railways.

BRITISH TRACKWAY.

ROMAN ROAD.

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LAMBETH PALACE AND ITS HISTORICAL ASSOCIATIONS. IV.

INTERIOR OF THE CHAPEL.

ıow proceed with our notice of Lambeth Palace, ı we shall conclude in the present article.

e Chapel is a very beautiful structure, and worthy e sacred office of the possessor of the palace. joins the cloisters, of which it forms the northern and is bounded to the west by the Lollard's r, to the south by the gardens, and to the east ıe long gallery and other parts of the palace.

ıe chapel bears evidence of very high antiquity. nsists of a body, measuring seventy-two feet in h, twenty-five in breadth, and thirty in height, livided into two, an inner and outer chapel, by legant carved screen. On each side are three :t-shaped windows, which bear a near resemblance ıose in the choir of the Temple church, and a r one at the east and west ends. The western window is divided into five lights, the others into three. In the midst of the former, which is partly walled up, is a beautiful little Gothic shrine or niche, supported by an angel holding a shield of arms. The chapel has a flat pannelled ceiling, painted in compartments; and the pavement is composed of squares of black and white marble laid in a chequered form.

The ornamented ceiling at present seen in the chapel, is not the original one, but was the work of Archbishop Laud, whose arms are painted over the communion-table in eight different compartments. The same arms are also placed in the ante-chapel, above the west door, as are likewise those of Archbishop Juxon, which shows that both those archbishops repaired and beautified the chapel. Archbishop

Laud thus speaks of this building in his time:—"The chapel is divided into an inner and outer chapel; and the screen or partition of the chapel which makes it two was just in the place where it now stands, from the very building of the chapel." But before his time it "lay nastily, but he greatly repaired and beautified it."

This chapel having been almost entirely despoiled and desecrated during the period that Lambeth Palace was in the possession of Colonel Scott, during the civil wars, the present elegant wainscotting and fittings-up were in all probability owing to the munificence of Archbishop Juxon, the first holder of the see after the Restoration. The interior fittings consist of a handsome range of pews or stalls on each side, for the officers of the archbishop's household, with seats beneath for the inferior domestics. Other parts of the interior fittings are, the screen, which divides the building into two chapels, the altar-piece, a gallery under the western window, with a kind of reading-desk in front of it, but probably originally intended for an organ loft.

There is a profusion of elegant carving about these fittings; particularly in the screen, and in the archbishop's seat or stall, which adjoins one side of the screen.

The altar-piece is of the Corinthian order, painted of a kind of stone colour, and gilt. The floor, which is raised a step higher for the communion-table, is railed in and neatly carpeted, and has the words "SURSUM CORDA*" above the table. On the southern side of the chapel is a plain moveable pulpit, and immediately opposite, over the vestry-room, is a pew or box, lined with crimson curtains, &c., in which the private family of the archbishop sit during divine service.

It has been supposed that the elegance of its present appearance is different from the greater splendour and magnificence which used to distinguish ecclesiastical buildings at the time when the English church was Roman Catholic. Cardinal Pole added much to the embellishments of the chapel, but they were removed again by the next primate Archbishop Cranmer.

There was an organ in the chapel in the time of Cranmer, who bequeathed it to his successors; as did likewise Archbishop Laud, by the following clause in his will:—

Item, I give to my successor (if the present troubles in the state leave me any) my organ in the chapel at Lambeth, provided that he leave it to the see for ever. Likewise I give him my barge and the furniture to it. But in case the archbishopric be dissolved, as it is threatened, then I will that my executor add the organ, the barge, and such things as are mine, to my estate, that is, *if they escape plundering*.

The troubled tone of this clause was occasioned by the unsettled state of all our national institutions during the civil war.

It has been considered somewhat remarkable that there has been no organ in the chapel in modern times, since there was one in earlier periods.

The most beautiful object in this chapel, before the civil war, was the splendid specimen of stained glass contained in the windows which were put up by Archbishop Morton. The subject represented on this glass was the history of man, from the Creation to the Day of Judgment, three lights in a window. The two side-lights contained the types in the Old Testament, and the middle light the anti-type and verity of the New Testament. The outer chapel had two windows, on which were represented the Day of *Judgment*. Archbishop Laud, when he came to Lambeth first, found these windows "shameful to look on, all diversely patched, like a poor beggar's coat," to use his own words; and he repaired them. This laudable endeavour of the archbishop, which, if it had occurred in our own times, would have been deemed a mark of liberality and good taste, was in his own attributed to him as a crime, as if he wished to revive Catholic custom and structures; but this he was able distinctly to disprove.

There is no account of any interments having taken place in the chapel, except that of Archbishop Parker, who died in 1575, and desired to be buried here. Accordingly, at his death, his bowels were put into an urn, (or *pitcher*, as one writer calls it,) and deposited in the chapel in the parish church at Lambeth; while his body was interred in the chapel of the palace, against the communion-table on the south side, under a monument of his own erecting.

The plate kept in the chapel is, a plate or dish, two flagons, a chalice or cup, (on the cover of which is a lamb, holding a banner with a cross,) and two candlesticks. These articles of plate generally passed from one archbishop to another, especially since the time of Sheldon, who gave it by will to his successors to hold in it a life interest. The common prayer-books being old and worn out, Archbishop Hering bought several new ones in quarto, handsomely bound and gilt, and covered the great chair near the communion-table with silk, which has since been exchanged for velvet.

We must now quit the chapel, and conduct the reader to the *Lollard's Tower*; but before doing so, it may be as well to explain briefly who the Lollards were.

One of the most eminent promoters of the Reformation which ultimately changed the national religion in England, was John Wickliff, who was born in Yorkshire in 1324. After Wickliff had completed his studies, become master of Baliol College Oxford, and warden of Canterbury, he began to promulgate views and opinions hostile to the Roman Catholic faith (which was at that time the national religion of England),—or rather, hostile to the supremacy of the Pope. The Pope sent a bull or mandate to England, ordering the Archbishop of Canterbury and the Bishop of London to assist the king and government to put down the opinions which Wickliff was promulgating. Some of the nobles were for and others against Wickliff, and long debates and contests ensued. The death of the Pope annulled the order which had been received from him; and the disputes between his successors, Urban the Sixth, and Clement the Seventh, gave Wickliff a new handle for exposing the proceedings of the papal power. After this he was obliged to make a confession of his errors before Archbishop Courtney and other bishops, and then remained tolerably quiet until death.

But his doctrines did not die with him. Payne, one of his disciples, carried his system of religious opinions into Bohemia, where it flourished in spite of persecution, and awakened the zeal of John Huss, who though he did not adopt all the doctrines of Wickliff, agreed with many of them. From England and from Bohemia the Reformers, or those who differed from the papal doctrines, spread through various countries, and were known by different names. Among them were the *Lollards*, which is considered to be nearly an equivalent term to *Wickliffites*. As to the origin of the word, opinions differ; some referring it to a leader named Lollard, and others deriving it from the German verb "lullen," to sing in a low tone, —a custom with the early reformers.

Be this as it may, the Lollards met with the fiercest

* "Set thy heart on things above."

opposition in England from the dignitaries of the church. Henry the Fourth enacted a severe law against them, which condemned to be burnt, all who, being convicted before the bishop of the diocese, or falling into heresy, or adopting Wickliff's opinions, should either refuse to abjure their imputed errors, or relapse into them after previous abjuration. Upon a certificate of obstinate or relapsed heresy, furnished by the diocesan, the sheriff or other local magistrate was commanded to commit the offender to the flames. Archbishop Arundell was one of the fiercest persecutors of the Lollards, among whom one of the early victims was Sir John Oldcastle, Lord Cobham. Another holder of the same see, Archbishop Chichely, the successor of Arundell, built, in the year 1434, a strong tower in Lambeth Palace, for the imprisonment of the Lollards. —This then is the origin of the *Lollard's tower*.

The prison-room in this tower where the unhappy victims are supposed to have been confined, is reached by a small spiral stone staircase, the steps of which are much decayed. It is entered by a little pointed stone doorway, barely sufficient for one person to pass at a time, the doorway having an inner and outer door of great strength, made of oak, and thickly studded with iron. The first thing that arrests the attention on entering, is the large iron rings fastened to the wainscot which lines the wall. There are eight of these rings still firmly fixed, at about breast high; viz., three on the south side, four on the west side, and one at the north side. To these rings the prisoners were doubtless chained. The wainscot, the ceiling, and every part of this chamber, is entirely lined with oak nearly an inch and a half in thickness. It has two very small windows, narrowing outwards, one to the west, the other to the north. A small chimney is on the north part, and upon the sides are various scratches, half sentences, initials, crucifixes, and other rudely carved symbols, cut by the poor prisoners who have been confined there.

There was another room for prisoners adjoining the porter's lodge in the gate-house. The room contains three strong iron rings fastened into the wall, and which have evidently remained there from its first erection. It is guarded by a double door: the windows are high and narrow, and the walls are lined with stone, and are of a prodigious thickness. An additional proof of the purpose to which this room was anciently appropriated is to be found in the circumstance that there are inscriptions cut in the wall, similar to those in the Lollard's tower.

There is a room in the Lollard's tower called the *post room*, from a large post or pillar in the middle of it which supports the roof. It forms a kind of western entrance to the chapel, but its original destination does not very clearly appear

The exterior of the Lollard's tower, when viewed from the Thames, has a fine venerable appearance, and is the only part of the ancient palace now remaining which is built entirely of stone. It consists of a large tower, and a smaller square projection on the south side; the whole being five stories high. The larger tower has in front a number of fine windows, which give light to the several apartments it contains. The smaller tower, at the top of which is the prison, is plainer and more massy in its appearance. Between the two windows of the third story of the larger tower is the beautiful niche, in which originally stood the statue of Thomas à Becket, the sculpture of the upper part of which is still fresh and sharp. The lower stories of these towers are now used as cellars.

The expenses attending the erection of this tower will give an idea of the value of labour and of building materials in the year 1434.

In the steward's accounts, the whole expense of the tower is stated at 278*l.* 2*s.* 11¼*d.*

Every foot in height of the tower, including the whole circumference, cost 13*s.* 4*d.* for the work. The iron work used about the windows and doors amount to 1322½ lbs. in weight, at three half pence per pound =10*l.* 14*s.* 11¼*d.* Three thousand bricks were used for stopping the windows between the chapel and the tower. The image of Thomas à Becket, placed in the niche before-mentioned, cost 13*s.* 4*d.* A bricklayer's daily wages were then, 4*d.* with victuals; and 6*d.*, or 6½ without victuals. A labourer with victuals, 3*d.*, without victuals 3½*d.*

Here we must conclude our notice of Lambeth Palace, and of the various historical events which are associated with it; and in so doing we may merely remark that the present Archbishop of Canterbury, in making the extensive improvements to which we alluded in the last article, has been careful to preserve all the leading marks by which the eye of the biographer, the historian, and the philosopher, have recognised it from age to age: the grand gateway and towers, the hall, the water tower, the Lollard's tower, the chapel, and the high brick tower eastward of it, although they have been repaired, have suffered no alterations in their external style.

Let every one that is struck with horror at the mention of a man void of pity, that feels resentment at the name of oppression, and melts with sorrow at the voice of misery, remember that those who have now lost all these sentiments were originally formed with passions, and instincts, and reason, like his own: let him reflect that he who now stands most firmly, may fall by negligence, and that negligence arises from security. Let him, therefore, observe by what gradations men sink into perdition, by what insensible deviations they wander from the ways of virtue, till they are at length scarce able to return.—Dr. Johnson.

THE BOOK OF KNOWLEDGE.

Let a being be conceived, in whose mind is concentrated the intelligence of all those men who before him have meditated upon spectacles of the universe, and understood aught of it. Let every thought which has occurred to each of them individually, present itself, in combined order, and with a perfect arrangement, to him; let him thus unite all the effective intellectual powers of all his predecessors in the path of investigation, and with this power let him combine proportionate physical resources; let him have been gifted with absolute ubiquity on the earth's surface; and let him have swept the whole face of the heavens with a vision as piercing as that of the most powerful glass with which the skill of the optician has ever extended the range of human sight; above all, let this being combine in a moment of time all the experience of slowly recurring events, which a life continued through thousands of preceding years would have given him: and yet will this being, gifted as I have supposed him, not be without his type. I have endued him with no attributes other than those with which it is possible for any man of common understanding, leisure, and resources, to surround himself.

The book of knowledge is open before every man, and he may there make his own the thoughts of all the master spirits of the by-gone world; they may become his thoughts, and the collective intellectual power of those thoughts his power. He has not, indeed, the faculty of absolute ubiquity, and cannot at his will be present everywhere, but for every purpose of science his resources are as great as though he had that power; there is no portion of it, or scarcely any, undescribed by those who have trodden it: and for his purpose the collected observations of others are the same as though he could himself at any instant make them on any portion of the globe. And then again, at any moment he can spread before him the registered observations of all preceding astronomers; and although these have been the laborious accumulation of years, his power over them is the same as though he could at the very instant of his inspection repeat them.—M.

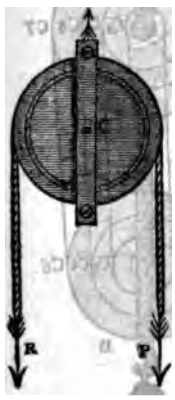
MECHANICAL POWERS. IV.

3. THE CORD AND PULLEY.

THE wheel is much more extensively employed in the construction of machines, than any other mechanical power; and there are a vast number of useful modifications of it, which however we have not space enough to describe, and must therefore pass on to another mechanical power, the pulley.

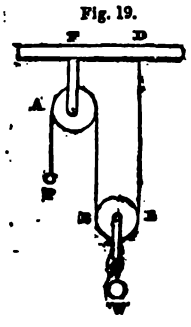
This depends on a totally different principle from that of the two former powers; its principle being that *when a body is suspended by two or more cords or ropes, they all bear an equal portion of the weight.* By a *cord* is meant any perfectly flexible body, such as a chain, rope, or string. Such a body differs from a solid inflexible one in this, that it will transmit a *pulling*, but not a *pushing* force. So far it has a disadvantage, which a solid bar has not; for with a bar we can both push and pull, but with a chain or rope we can only pull. But the flexibility of the cord gives it this great advantage, that by it we can alter the direction of a force. In order to do this, the cord must be stretched over some solid body, and the body generally used is a *pulley*, which is a small wheel, having a groove cut round the edge, and turning freely on an axle, bearing at the sides a small frame, called a *sheaf*, as at C below. If the cord be passed over such a pulley, the direction of the pulling force can be changed: thus in the following figure it may be changed, at P or R, from a downward force to an upward one. Such pulleys are very useful, when the force has to be transmitted through a winding path.

Fig. 18.



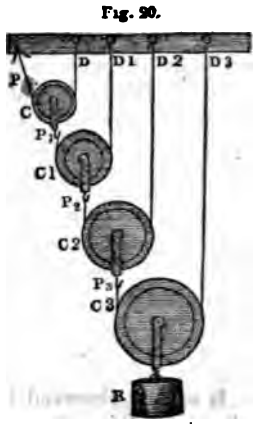
But, in order to increase the power, another kind of pulley is used, whose sheaf, instead of being fixed to a wall, beam, &c., is allowed to move up and down. If in the figure above, which is termed a *fixed* pulley, we hang a weight of 10 lbs. to one end of the rope, and sustain it by pulling the other end, we must pull with a force of 10 lbs., and to draw it up we must exert a force rather greater. Now let the reader provide himself with two small pulleys: let one be fixed to some convenient place, as that of A to the beam F D, fig. 19; and to the sheaf of the other fix the weight W. Let a string have one end fixed at D, and pass under the moveable pulley B, and over the fixed pulley A. Now if the weight W be 10 lbs., we need only pull with a force of 5 lbs. at P to sustain the weight. The reason of this is that the weight is divided equally between the two portions of string, B A P and E D. 5 lbs. therefore are supported by the string D E, leaving only 5 lbs. to be supported by the force acting at P. If this appear strange, it can be proved in another mode. In order to raise the weight W through one foot, each of the strings D E and B A has to be shortened one foot: but these strings form parts of the same string D E B A; therefore the whole of this string must be shortened two feet, that each of its halves may be shortened one foot. So two feet of string must pass over the pulley A, and the power P must move through *two feet, in order to raise* W one foot: therefore, by the fundamental law of mechanics, velocity is lost, and power must be gained, and any power acting at P must balance twice as much resistance acting at W. Thus, in whatever way we view the case, we arrive finally at the same conclusion, and that conclusion will be found by experiment to agree with the real fact.

Fig. 19.



Now, by the addition of another moveable pulley, the power may be again doubled, so as to be quadruple of the original power, and by another pulley it may be doubled again, and so on to any extent; the pulleys being arranged in a system like the following, each pulley hanging by a separate string. In this combination the power is increased sixteen times; so that a weight of 16 lbs at R can be supported by a force pulling up at P with a power of one pound. Thus, half the weight of R is sustained by the string D 3, and the other half by the string P 3, C 3; so that the string P 3 need only be pulled up with a force of 8 lbs. Half of this 8 lbs. is sustained by the string D 2; so that the string P 2, C 2, only sustains 4 lbs., which being divided equally between D 1 and P 1, the latter P 1, C 1, bears only 2 lbs, one of which is sustained by the string D, and the other by the power acting at P. Every moveable pulley, therefore, which is added to this combination, doubles the gain of power. Thus, with five moveable pulleys, the power would be multiplied thirty-two times; with six pulleys, sixty-four times, and so on.

Fig. 20.



The next figure represents another kind of moveable pulley, which *trebles* the power, instead of doubling it. Here the power P acts on one end of a string which passes over the fixed pulley A, under the moveable pulley C, over the fixed pulley P 2, and is attached to the sheaf of the moveable pulley at P 3. Here the weight R is supported by the three strings C, P 3, and P 1, each bearing a third of the weight. Therefore the string P 1 need only be pulled up with a force of 1 lb., in order to sustain a resistance of 3 lbs. at R.

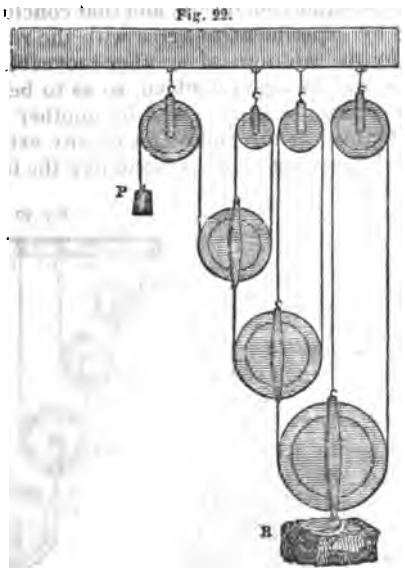
Fig. 21

It will be found that in this, not less than in any other mechanical combination, the power is not really increased. In order to raise the weight R one foot, each of the strings, C, P 3, and P 1, must be shortened one foot. Therefore the whole string must be shortened three feet, and the power P must descend three feet; and it requires as much absolute power to move 1 lb. through three feet, as 3 lbs. through one foot. The fixed pulley A is only used to reverse the direction of the force, and is not necessary to increase the power; for we might as well pull the string P 1 upwards with a force of one lb., as pull P downwards with a similar force; but the latter is found most convenient in practice.

In the next figure is shown the manner in which a number of these pulleys may be combined, so as to form a system. The principle is exactly the same as in fig. 20; but each moveable pulley *trebles* the gain of power, because it is supported by three portions of

string instead of two. Thus, in this combination of three moveable pulleys, the power is increased twenty-seven times; with four it is increased eighty-one times; with five 243 times; and so on.

Fig. 22.



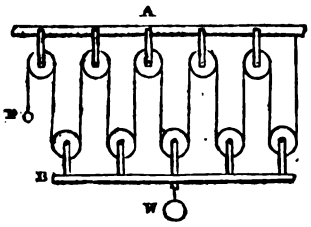
It will be observed in the last three figures, that the nearer the pulley is to the resistance R, the larger is its diameter. The reason of this is that the pressure upon the axes continually increases from P to R, and these are gradually made larger for the sake of greater strength. This causes the friction upon them to increase; and the diameters of the pulleys are therefore enlarged, that each may act with the same power to overcome that friction.

But in these systems of pulleys, the tackle soon becomes entangled; for the upper pulleys move much more quickly than the lower ones; so that their relative positions and distances are always varying, and the weight can only be raised to a very small height; so that such systems are practically useless.

When, therefore, it is required to make one weight raise another more than four or five times its own weight, another system is used, which also has its defects: for though it increases the power, it has more friction and a greater number of pulleys. The following figure represents the simplest form of this class of pulleys.

Here the whole number of pulleys is always equal to the number of times that the power is to be increased. Half of them are fixed and half moveable; the former being fixed to a beam A, and the latter to a bar B, to which the weight W is attached. Only one string is used, which has one end fixed to a hook in the beam A; it then passes alternately over a moveable and a fixed pulley, and bears at its other

Fig. 23.



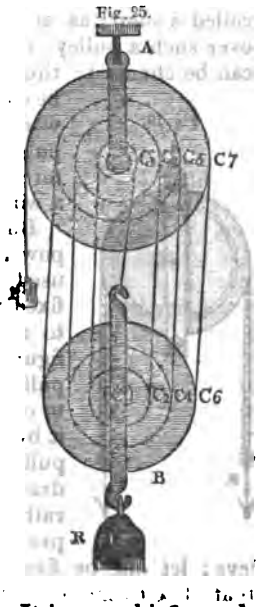
end the power P. As the weight is here supported by ten strings, the power P in descending a certain space, raises the weight W only one-tenth of that space; and the power is therefore multiplied ten times. One pound at P supports ten at W.

In practice, however, a much more compact form is used. All the fixed pulleys are placed side by side, in a kind of case called a *block*, and to a similar block the weight is attached. As the power descends, the two blocks approach each other, till they meet. A small combination of this kind is represented in fig. 24, in which there are three pulleys in each block, and the power is therefore increased six times. A great many different kinds of blocks have been proposed, for obviating various defects; but perhaps the best blocks are those represented in fig. 25.

Fig. 24.

This contrivance is known by the name of White's pulley: its object is to make all the pulleys in each block, A and B, turn together on the same axis; whereas in common blocks, as the pulleys revolve with different velocities, and are equal in size, their axes also revolve with different velocities, and are therefore separate, which is a disadvantage. In White's block the different pulleys are not equal; but their diameters vary in such a manner that, though their circumference revolve with different velocities, yet their axles do not. To effect this, the diameters of the upper or fixed pulleys must be as the odd numbers 1, 3, 5, 7, &c.; and those of the lower or moveable pulleys, as the even numbers, 2, 4, 6, 8, &c. The cord then passes first over the largest pulley of the upper block, C 7, then over the largest of the lower block, C 6, and so on, over a smaller pulley each time, till it is finally fixed to a hook in the lower block. This pulley suffers less from friction than others.

Fig. 25.



The pulley has on the whole many defects, which do not belong to the other mechanical powers. It is, and always must be, a complex machine, and is therefore liable to get out of order. It is now chiefly used in the tackle of ships.

We must now describe a very ingenious kind of windlass, which, though it depends on the principle of the wheel and axle, could not well have been understood before the nature of the pulley was explained; and it has therefore been reserved for this part of the subject. It differs from the common wheel and axle principally in this,—that, in the latter, if a great increase of power be required, there must be as great a difference as possible between the diameters of the two cylinders; but in this windlass that difference must be as small as possible. It is represented in fig. 26; and is perhaps the simplest contrivance for making a very small weight support a very great one.

It consists of two nearly equal cylinders A and B, fixed on the same axle, C D, so as to be turned together by the winch E. The weight W is suspended by a rope wound round both cylinders in a contrary direction, and passing round a moveable pulley, F G, attached to the weight.

Now refer to fig. 27, where the letters are placed at the same part as in fig. 26. Here the weight W is

divided equally between the two strings C and F, which may be considered as acting at different parts of the lever B A, whose fulcrum is at O; the common

Fig. 26.

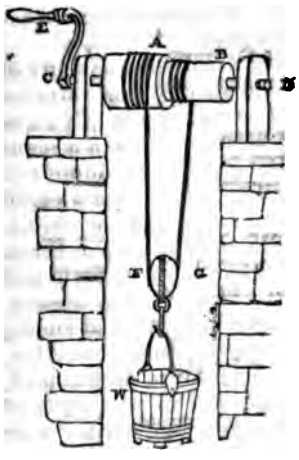
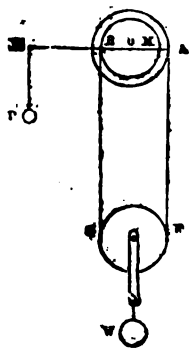


Fig. 27.



axis of the two cylinders. Now, the two strings act at points not quite at the same distance from O, for O A is larger than O K or O B; so that they will not quite balance each other; but a very small additional weight acting at E will be sufficient to balance them. It will be observed that the same motion which unwinds the cord from one cylinder, winds it on the other, but not in equal quantity. Hence, when the cord is being wound off from A on to B, more cord is unwound than wound; the loose cord is therefore lengthened, and the bucket W descends. But when the cord is being wound off from B on to A, the loose part is shortened and the bucket rises. The smaller the difference between the two cylinders, the more slowly will the weight W move in comparison with the power P; and the less power will therefore be required at P to raise W. If this difference were nothing, or the two cylinders were equal, the power required at P would also be nothing; but then the weight could neither rise nor fall; for whichever way the winch were turned, there would be as much cord wound off from one cylinder as was wound over the other.

Poets and travellers speak with enthusiasm of the sun-sets of Italy, Switzerland, and Greece. I have seen the sun go down in each of those countries, but never with half the splendour which on this day accompanied his disappearance; and could I succeed in reflecting upon the reader's imagination half the grandeur of this gorgeous show, he would unquestionably concur with me in thinking that, but for its evanescent nature, it was far more worth a voyage to Egypt even than the pyramids. No sooner had the sun's disk disappeared behind the Libyan desert, than the whole western sky along the edge of the horizon assumed a colour which, for want of a better term, I shall call golden: but it was a mingling of orange, saffron, straw-colour, dashed with red. A little higher, these bold tints melted into a singular kind of green, like that of a spring leaf prematurely faded; over this, extended an arch of palish light, like that of an aurora borealis, conducting the eye to a flush of deep violet colour, which formed the ground-work of the sky, on to the very skirts of darkness. Through all these semicircles of different hues, superimposed upon each other, there ascended, as from a furnace, vast pyramidal irradiations of crimson light, most distinctly divided from each other, and terminating in a point; and the contrast between these blood-red flashes and the various strata of colours which they traversed, was so extraordinary, that, I am persuaded, no combination of light and shade ever produced a *more wonderful or glorious effect.*—*St. John's Egypt.*

OLD ENGLISH BALLADS

SELECTED FROM BISHOP PERCY'S RELICS OF ANCIENT ENGLISH POETRY.

KING LEIR AND HIS THREE DAUGHTERS.

King Leir once ruled in this land with princely power and peace;
And had all things with heart's content, that might his joys increase.
Amongst those things that nature gave, three daughters fair had he,
So princely seeming beautiful, as fairer could not be.

So on a time it pleased the king a question thus to move,
Which of his daughters to his grace could show the dearest love:
For to my age you bring content, quoth he, then let me hear,
Which of you three in plighted troth the kindest will appear.

To whom the eldest thus began; dear father, mind, quoth she,
Before your face, to do you good, my blood shall rendered be:
And for your sake my bleeding heart shall here be cut in twain,
Ere that I see your reverend age the smallest grief sustain.

And so will I, the second said; dear father, for your sake,
The worst of all extremities I'll gladly undertake:
And serve your highness night and day with diligence and love;
That sweet content and quietness discomforts may remove.

In doing so, you glad my soul, the aged king replied;
But what sayst thou, my youngest girl, how is thy love allied?
My love (quoth young Cordelia then) which to your grace I owe,
Shall be the duty of a child, and that is all I'll show.

And wilt thou show no more, quoth he, than doth thy duty bind?
I well perceive thy love is small, when as no more I find.
Henceforth I banish thee my court, thou art no child of mine;
Nor any part of this my realm by favour shall be thine.

Thy elder sisters' loves are more than well I can demand,
To whom I equally bestow my kingdom and my land,
My pompal state and all my goods, that lovingly I may
With those thy sisters be maintained until my dying day.

Thus flattering speeches won renown, by these two sisters here;
The third had causeless banishment, yet was her love more dear:
For poor Cordelia patiently went wandering up and down,
Unhelped, unpitied, gentle maid, through many an English town:

Until at last in famous France she gentler fortunes found;
Though poor and bare, yet she was deemed the fairest on the ground:
Where when the king her virtues heard, and this fair lady seen,
With full consent of all his court he made his wife and queen.

Her father king Leir this while with his two daughters staid:
Forgetful of their promised loves, full soon the same decayed;
And living in queen Ragan's court, the eldest of the twain,
She took from him his chiefest means, and most of all his train.

For whereas twenty men were wont to wait with bended knee:
She gave allowance but to ten, and after scarce to three;
Nay, one she thought too much for him; so took she all away,
In hope that in her court, good king, he would no longer stay.

Am I rewarded thus, quoth he, in giving all I have
Unto my children, and to beg for what I lately gave?
I'll go unto my Gonorell: my second child, I know,
Will be more kind and pitiful, and will relieve my woe.

Full fast he hies then to her court; where when she heard his moan
Returned him answer, that she grieved, that all his means were gone:
But no way could relieve his wants; yet if that he would stay
Within her kitchen, he should have what scullions gave away.

When he had heard, with bitter tears, he made his answer then;
In what I did let me be made example to all men.
I will return again, quoth he, unto my Ragan's court;
She will not use me thus, I hope, but in a kinder sort.

Where when he came, she gave command to drive him thence away:
When he was well within her court (she said) he would not stay.
Then back again to Gonorell the woefull king did hie,
That in her kitchen he might have what scullion boys set by.

But there of that he was denied, which she had promised late:
For once refusing, he should not come after to her gate.
Thus twixt his daughters, for relief, he wandered up and down;
Being glad to feed on beggar's food that lately wore a crown.

And calling to remembrance then his youngest daughter's words,
That said the duty of a child was all that love affords:
But doubting to repair to her, whom he had banished so,
Grew frantick mad; for in his mind he bore the wounds of woe:

Which made him rend his milk-white locks, and tresses from his head,
And all with blood bestain his cheeks, with age and honour spread.
To hills, and woods, and watery founts, he made his hourly moan,
Till hills and woods, and senseless things, did seem to sigh and groan.

Even thus possessed with discontents he passed o'er to France,
In hopes from fair Cordelia there, to find some gentler chance;
Most virtuous dame! which when she heard of this her father's grief,
As duty bound, she quickly sent him comfort and relief:

And by a train of noble peers, in brave and gallant sort,
She gave in charge he should be brought to Aganippus' court;
Whose royal king, with noble mind so freely gave consent,
To muster up his knights at arms, to fame and courage bent.

And so to England came with speed, to repossess king Leir,
And drive his daughters from their thrones by his Cordelia dear.
Where she, true-hearted noble queen, was in the battle slain,
Yet he good king, in his old days, possessed his crown again.

But when he heard Cordelia's death, who died indeed for love
Of her dear father, in whose cause she did this battle move;
He swooning fell upon her breast, from whence he never parted;
But on her bosom left his life, that was so truly hearted.

The lords and nobles when they saw the end of these events,
The other sisters unto death they doomed by consents;
And being dead, their crowns they left unto the next of kin:
Thus have you seen the fall of pride, and disobedient sin.

SOME ACCOUNT OF THE ASSASSINS OF ASIA.

We have, in a former number, given a brief account of a most extraordinary band of murderers who have infested India for a great length of time, and who have defied the Hindoos, Mohammedan, and British powers, until a recent period. We now propose to draw the reader's attention to a sect of Mohammedans called *assassins*, or Ishmaelites, whose murders have caused almost all Europe to apply the term "assassin" to one who secretly and unexpectedly deprives a fellow-creature of life.

The sect had its rise about the year 1090, and was founded by Hassan Sabah, in a mountainous district near the Caspian Sea; but we must briefly notice a few circumstances which led to the establishment of this band.

Most of our readers are aware, that Mohammedanism sprang up in Arabia in the seventh century, and that the doctrines promulgated were,—that there is but one God, and that Mohammed is his prophet;—that the articles of faith were belief in God, in his angels, and in his prophets, in a final day of judgment, and in predestination; and that the religious rites consisted in ablution, prayer, fasting, alms, and the pilgrimage to Mecca. It is no part of our present purpose to dwell on the dreadful fact, that the faith was spread by means of fire and sword, nor on the sensual notions which they held respecting a future life, in which shady lawns, bubbling brooks, gilded kiosks and vases, soft couches, rich goblets, silver fountains, were promised to believers. It is to a species of dissenters from Mohammedanism that our attention is now to be directed.

No sooner was Mohammed dead, than a series of conflicts arose as to who should succeed him. Murder and disorder marked the succeeding years. No less than seventy-two different sects of Mohammedans sprang up, but they were principally divided into two grand divisions,—the *Soonnites*, who acknowledged one race of successor to Mohammed, and the *Shiites*, acknowledged another. The Mohammedans in Persia belonged to the latter class, while those in Syria and the neighbouring parts to the former. The Shiites, or Sheths as they are also called, were divided among themselves, as to certain religious points,—whether, for instance, the Iman, or successor to Mohammed, for the time being, was or was not in possession of divine attributes. These divisions and strifes were augmented by political and ambitious motions, and opposition soon became as strong as if they had all been of different religions.

As some of the Mohammedan sects possessed temporal power and others did not, it was to be expected that the latter would endeavour to overturn the former. Among the plans for so doing, there was one established by one Abdallah, in Persia, in the ninth century. He shook off, in some degree, the tenets of Mohammedanism, and promulgated a faith of his own; the true object was to overturn the caliphs then existing, and establish the ruling authority in a family called Ishmael, or Ishmaelites. For a whole century strife existed between this sect and the caliphs who enjoyed power.

One of these Ishmaelites contrived to gain possession of Egypt, so that the Mohammedan world saw two caliphs at once; one at Bagdad and the other at Cairo, who had a deadly hatred for each other. The Egyptian caliph and his adherents were looked upon as heretics by other Mohammedans; for it seems that they promulgated extraordinary doctrines. There was a secret society, or lodge, established among them, with the caliph at their head. Into this society youths were admitted, after a severe course of instruction: at a certain stage they were to swear eternal secrecy, as to the nature of the doctrines which they were afterwards to be taught, and which doctrines amounted almost to atheism; future rewards and punishments were said to be idle dreams,—that nothing was to be believed,—and that everything might be done.

Some doubts have been expressed as to whether such impious doctrines were really promulgated; but be that as it might, the secret lodge sent forth missionaries to every Mohammedan state, to draw away allegiance from the Caliph of Bagdad, and to transfer it to the Ishmaelite caliph.

About the middle of the 11th century there was a talented and ambitious man named Hassan Sabah, living in Persia. He was of a restless disposition, and tried to gain power by any means; and embroiled himself with the ruling power in Persia. At this time one of the emissaries of the secret lodge of Cairo, travelling in Persia, met with Hassan Sabah, and brought him over to the Ishmaelite party. There seems reason to believe that Hassan Sabah was sincere in his conversion to the belief that the Ishmaelites were the true descendants of Mohammed, however much ambition may have afterwards changed his plans. We must here remark that the impious doctrines of

the secret lodge were not communicated to proselytes, but only to the devoted servants of the society.

Hassan was urged by the emissary to go to Egypt, and attach himself to the Ishmaelite caliph. This he did, and was received with every demonstration of respect; this was in the year 1078. But although the caliph received him graciously, yet he soon became involved in disputes with parties who were contending for the succession to the throne. The result of this was, that he was forced to leave Egypt; and he sailed to the coast of Syria, where he landed.

It appears that he now began to entertain serious views of establishing a power for himself, independent of either caliph; but as he was too powerless to gain adherents at first, he appeared as an agent for the Ishmaelite caliph. He visited various parts of Asia Minor and Persia, and at last settled himself in a lofty mountain-fortress called Alamut, (*i. e.*, Vulture's Nest,) near the southern borders of the Caspian sea. In this fortress he remained thirty-five years, never quitting it on any occasion, but promulgating doctrines and issuing orders which his devoted adherents put into execution. He was known, by reputation at least, as the "Old Man of the Mountain," or sometimes as the "Sheikh of the Mountain," and was the founder and chief of that band or order which has been known as *Assassins*. Various opinions exist as to the origin of this word: some suppose that it was derived from Hassan, the founder of the sect, while others refer it to *Hashish*, the name of an opiate which used to be administered to some of the devotees.

We have thought it desirable to trace the circumstances which preceded, and in some respects caused the establishment of Hassan Sabah at Alamut, in order to understand better the nature of his fraternity. We find that he was a clever and an aspiring man, that he mixed himself up with the religious and political feuds that distracted the Mohammedan states, and that he lastly established himself as the head of a tribe. We must now proceed.

It was in the year 1190 that he took possession of Alamut by force; and he then proceeded with his plans, which were nominally to support the Egyptian caliph, but really to strengthen himself. He had seen that the atheistical doctrines of the Egyptian lodge were not calculated to make firm adherents, he therefore assumed an appearance of piety. In the words of Von Hammer,—

> Long experience and extensive knowledge of mankind, profound study of politics and history, had taught Hassan that an atheistical and immoral system was more calculated to accomplish the ruin than the establishment of dynasties, and the confusion rather than the ordering of states; that lawlessness may be the canon of the ruler, but ought never to be the code of the subject; that the many are only held together by the few by the bridle of the law; and that morality and religion are best sureties of the obedience of nations and the security of princes.

Hassan by degrees established an order or fraternity at Alamut, which consisted of several grades or ranks. At the head was himself, under the name of Sheikh, or leader; under him were three grand priors; in the third rank were *dais*, or initiated masters; in the fourth rank were *companions*, or fellows; the fifth consisted of devotees; and the sixth of aspirants or novices. All these ranks or orders had their respective duties, and it will be even seen that the scheme was such as to give great power to Hassan: to the initiated he gave three instructions:—1st, That they should obey him implicitly in all things; 2nd, That they were to observe inviolable secrecy; 3rd, That they might put *what interpretation* they pleased upon the Koran; *which amounted almost to* the abandonment of religion and morality. It will easily be seen, that the third point of doctrine was a reward for obedience to the first and second.

But with the lower grades, such as the devotees, a different plan was observed. Hassan here acted on the policy which we just alluded to, *viz.* to make religion the means of binding his subjects to him. The *companions* were to act as missionaries or emissaries, to convert proselytes, and carry on negociations. The *devotees* were to scour the whole face of Mohammedan countries, and assassinate with the dagger every one whom they were ordered by the Sheikh to murder, without questioning for an instant the motives for the act. These motives, it may easily be conjectured, were such as tended to strengthen Hassan's power. The noble and the wealthy were generally the victims to the daggers of the devotees, and thus was a secret dread inspired, which greatly favoured the plans of Hassan; for no one knew how near an assassin might be to him.

The devotees were generally either purchased or stolen from their parents while young, and educated with most rigid precautions, the principal point impressed upon their mind being, that the Sheikh was omnipotent; and that it was both criminal and utterly impossible for them to evade his orders, which were to be considered as revelations from heaven. It may easily be conceived what must have been the effects of such doctrines, implanted as they were from early youth, and woven into the very existence of the devotees. They were dressed in white, with red girdle and bonnets, and always carried sharp daggers. When, however, they had a commission to execute, they assumed all sorts of disguises. Their business was to put out of the way all whom the Sheikh either feared or hated, and they traversed every corner of Syria, and the surrounding nations. To use the forcible language of Von Hammer:—"the points of their daggers were everywhere: the hilts were in Hassan's hands." It has been said, that when the devotees were required to execute a dangerous or important commission, a powerful opiate was administered to them, under the influence of which, they were carried to the garden of Alamut, where, on awakening, they found themselves surrounded with every thing that could excite and charm the imagination and the senses. They were then told that this was a foretaste of the paradise to which they would go, if they implicitly obeyed the orders of the Sheikh. Thus it will be seen, that the same sensual and unholy ideas of rewards stimulated the devotees as the initiated, although in a different manner.

It may reasonably be supposed, that considerable time elapsed before the order or fraternity became thoroughly established. Persons had to be gained over by degrees; and additional castles and hill-forts had to be established before the power of the Assassins became formidable. We cannot dwell minutely on all these points; but in another article we shall give some instances of the terrible power of the fraternity; and shall briefly sketch the events which led to its suppression.

THE slave of pleasure soon sinks into a kind of voluptuous dotage; intoxicated with present delights, and careless of everything else, his days and his nights glide away in luxury or vice, and he has no care, but to keep thought away: for thought is troublesome to *him*, who lives without his own approbation.—DR. JOHNSON.

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THE AZORES, OR WESTERN ISLES. No. II.

FAYAL, WITH THE MOUNTAIN OF PICO.

FAYAL.

In this country, where Nature has done so much, and art and industry so little for its inhabitants, the practice of agriculture is but little, and the science of it less, known throughout the islands. "The rude system of their forefathers," says Captain Boid, "is still pursued, and their implements and utensils would be disgraceful to savages in the wilds of Africa. They merely turn over the soil, throw in the seed at random; and so bountiful is Nature, that a very short interval produces abundant returns. Such, in fact, is the capability of the soil, that were every advantage taken, these islands might furnish an ample supply of grain for the support of five or six millions of inhabitants, instead of 200,000. Even now they occasionally supply the markets of Lisbon, Oporto, and Madeira, with wheat, barley, and pulse, of all sorts."

Much good wine is made in these islands, that often passes for Madeira. Woad was formerly an important branch of commerce, and the sugar-cane was likewise cultivated. But, however industrious and commercially disposed the people of the Azores might be, the absolute want of a spacious, safe, and deep port, will ever prevent the commerce of these islands from rising to any great extent. Notwithstanding, the Dutch long ago exported fullers' earth in large quantities, from St. Michael's, and in the vale of Furnas, in the same island, there existed in the sixteenth century a manufactory of alum, that furnished 4833 quintals in the space of ten years.

If perchance it be deemed indispensable to give additional stimulus to the soil, they sow a crop of lupins, (which in these islands grow luxuriantly, and to an extraordinary size,) and, when about three feet high, they plough it all into the soil, which from the peculiarly fertilizing properties of this plant, receives a richness that soon renders it ready for the succeeding crop of grain. The lupin is a valuable herb in the Azores, and is everywhere cultivated to a great extent. The seeds, after being well soaked in salt, or sea-water, to divest them of their bitterness, constitute a favourite and most nutritious food for the lower orders, and the plant furnishes an excellent green meat for cattle, although, from its inebriating qualities, it should only be given in small quantities at a time.

Graciosa, St. Michael, and Fayal, may be considered, on account of the general superiority of soil, as the most flourishing in point of agriculture, and Pico, Terceira, and Santa Maria least so.

Settlers, and commercial visiters have, from time to time, introduced plants, herbs, and trees of various kinds, to such an extent, from all parts of the world, that the Azores already produce all the classes peculiar to northern, as well as many belonging to tropical and equatorial countries; "and so favourable," says Captain Boid, "is the character of the climate, that,

with care, scientific cultivation, and a choice of suitable localities, the productions of almost every part of the globe might be brought to perfection there. All those herbs and plants, celebrated for their medicinal qualities, essences, odours, and dyes, are to be found in abundance, and might, under the influence of commercial activity, furnish an immense source of wealth. Excellent coffee and tobacco grow luxuriantly, although now only cultivated for private consumption by a few individuals. All the most common, as well as delicate culinary vegetables known, are likewise included. White hemp and flax are both of fine growth, and furnish wherewithal to supply the poor with enough for their consumption of the manufactured produce.

"All the tuberose plants grow in these islands with great facility, and many are cultivated to a considerable extent, particularly the common and sweet potato, and the yam. The myrtle grows indigenously, and in large quantities: indeed it is so common, that the juice expressed from its branches is commonly made use of by the peasants for tanning their own leather.

"The fruits of the Azores might, by care and attention, be rendered, on account of the advantages of climate, even superior to those of any other country; but, in order for fruits to be brought to perfection, the exercise of delicate skill and horticultural science is generally requisite; and these being totally unknown here, many of the fruit-trees (of which every species may be seen) either bear no fruit at all, or such as is of a nature ungrateful to the palate: for instance, the peach, apricot, olive, and others. The luscious banana, however, grows here luxuriantly, and is not only a great acquisition as a fruit, but also gives an additional charm to the face of the country, from its beautiful and picturesque foliage, which fills up many a landscape with gracefulness, that to be duly appreciated should be seen, not described."

With respect to gardening, general absence of all taste or skill, nay, even of inclination to acquire them, is so great, that it is totally neglected, except amongst a few foreign settlers, English and American, who here and there display that refined taste which superior education always imparts, and at the same time they have furnished a proof of the perfection to which the productions of the vegetable world may be brought in this lovely climate. We might particularize the quinta or orange-grove of the American consul of Fayal, whose house, built by himself, stands on an eminence, looking towards the sea, in front of the picturesque mountain of Pico. The like observation may be made respecting the once noble palace of the ex-jesuits, (the most sumptuous erected by them in the Azores,) the splendid Carmelite monastery, with its Arabian turrets, and the convent of St. Antonio on an isolated terrace to the right. All these are more like the dreams of an Arabian tale, than real existence. At this point of the island is seen the mountain of PICO, which raises its sugar-loaf top at the background of our *frontispiece*, having its summit girt with clouds, or covered with snow. A crater exists at the top of this eminence, which constantly emits smoke. But in the part of Fayal, which the engraving at the head of this article affords a view of, is exhibited, at one *coup d'œil* in the surrounding gardens, the most striking and magnificent combination of beautiful shrubs and flowers peculiar to all climates and countries, that can be imagined. With all the rare productions that now constitute the pride of our European horticulturists, may be seen tastefully mingled *the ornamental* trees and plants of the tropics, *namely all the various* tribes of palms, the numerous species of cactus, the dragon's blood, aloe, Judas-tree, &c., which, blended with the fig-tree, our own admired weeping willow, the orange, lemon, and vine, produce an effect perfectly enchanting, nay even the beauty of our own native flowers is here improved! The hydrangia, geranium, and oleander, are of enormous growth; and the camelia japonica rises up with the height and strength of a forest-tree.

It appears that the orange was not known to the ancients, although some authorities think that this fruit is alluded to in Scripture, particularly in the 23rd chapter of Leviticus; one of the trees borne in the procession being supposed to be that of the orange. The most general opinion is that the Arabs first introduced this fruit into Europe. The Portuguese also in their voyages to India and China, found the orange in those countries at the beginning of the sixteenth century; and they also introduced the fruit into the Azores, which fruit at the present time is cultivated so extensively. Some interesting details respecting the orange have already been given in our fifth volume.

AMERICAN MARRIAGES.

THE first marriage ceremony I witnessed in America took place at the lonely little hamlet of Fort Erie in Upper Canada. I was then almost a stranger in the land, nevertheless, I received an invitation couched in phrase polite, from Major, *alias* Squire, W——n, (for he was a major of militia as well as a magistrate,) to attend the marriage of his eldest daughter. Although I then knew but little of the country and its inhabitants, I had been made acquainted with the narrowness of the major's circumstances, in short, of his comparative poverty; but this did not surprise me, since I knew it to be a very common case with many majors, colonels, and squires, on the western side of the Atlantic. The alliance which the major's daughter was forming was one that greatly delighted the father; for the individual was not only a man of unsullied reputation, but likewise a colonel of militia, and the keeper of a respectable "store," in a flourishing settlement, on the western part of Lake Erie.

It will not be out of place here to remark, that amongst the "better sort" of the inhabitants of Upper Canada, there is much aping of gentility, so that many families, in very indifferent circumstances, consider themselves as belonging to the aristocracy of the province, and profess to be much shocked with the boorish manners of the emigrant Scotch and English farmers, who are, in fact, ten times better off; and who, without suspecting anything of the gentility of the "early settlers," (probably judging from the poor appearance of their farms and dwellings,) take the liberty of locating themselves wherever they may be the best suited. I suspect that this aristocratic feeling has been mainly superinduced by the early settlers having had much familiar intercourse with the military officers formerly stationed amongst them; and though the forts have long since been dismantled, and the military removed from the upper part of the country, yet the people continue to tell of the "military balls," and "splendid routes," in the days that are long since passed.

It seemed to be the major's wish that his daughter's wedding should be no ordinary occasion; and, therefore, to make the matter *tell*, the greater portion of the "admissibles" of the Niagara district were invited to assemble at his small wooden cottage, at seven o'clock in the evening of an autumnal day. Presuming that punctuality would be looked for on

so "interesting an occasion," I found myself opposite the mouldering walls of the old fort, and therefore within a stone's cast of the major's dwelling, just as the report of the seven o'clock gun came booming across the eastern extremity of the lake from the (then) village, but now town, of Buffalo; and a few minutes afterwards I found myself in the midst of the bridal party. The major and his lady (all females, with exceedingly few exceptions, are *ladies* in America), were there to receive their guests in due form, and considering their condition in life, I was both surprised and pleased with the manner in which they acquitted themselves; for there was more genuine good-breeding in that little uncarpeted and wainscotted parlour, than in apartments which I had elsewhere seen, that were, in fact, perfect palaces compared with Squire W——n's lowly dwelling. Shortly after my arrival, I was ushered into a small adjoining room, (a bed-room, nine feet by seven,) where, upon a small dressing-table, were displayed two or three dozen pair of white kid-gloves, that would have done credit to one of the most fashionable shops in Bond or Regent-street. Where or how these things had been procured was a mystery to me; but having made my selection of a pair of suitable size, I again took my place in the company assembled from I know not how many counties. I afterwards understood that the small apartment was the dormitory of an itinerant schoolmaster, who, on the night in question, had been driven from his nightly quarters to make room for an occasion that might never again return. A murmur, rather audible than loud, presently pervaded the assembly; and by a little attention I soon gathered its meaning from those around me,—it was in consequence of the non-arrival of the Rev. Mr. L——g, the episcopal minister, who had been invited to perform the marriage ceremony. Now the reverend gentleman resided at Lundy's Lane, near the Falls of Niagara, and consequently eighteen miles distant from Fort Erie; and the roads being in bad condition, and the night unusually dark, some apprehension began to be entertained for the minister's safety.

Surmises to this effect caused the bride to look paler than usual, while the bridegroom became every minute more fidgetty; but, by-and-by, some one ventured to intimate that there was no reason to apprehend any serious disappointment, since there were no fewer than four magistrates present, any one of whom had the power, according to the law of the colony, of uniting the couple, in case the minister should not make his appearance. This, however, would not be doing the thing genteelly; but just as it was about to be carried into effect, the wagon containing the minister and his lady drove up to the door of the cottage. The delay had taken place in consequence of one of the bridges over the numerous creeks being in so bad a condition, that it was with the greatest difficulty that the vehicle could be got over at all, and this at the inconvenience of a serious injury to one of the wheels of the wagon. Without wasting more time, the reverend gentleman forthwith proceeded to marshal the company agreeably to the arrangements on such occasions. The usual ritual was read from a Book of Common Prayer; and, judging from appearances, there was no want of that proper feeling and decorum the occasion always seems to call for. When the ceremony was over, or rather when the minister had closed his book, he next saluted the blushing bride. This seemed the signal for a general rush on the male part of the company to follow up the clergyman's example; and somehow or other (without any exertion of my own) I found myself carried away by the tide into the immediate vicinity of the object of such general attraction, and the next moment my lips were pressed to that cheek which a few moments before I deemed should have been sacred to him alone who had solemnly pledged himself "to love and cherish unto death." At that time I was far from approving of this (said to be) a good old custom; but example and mechanical impulse carried me away from my purpose (for I had predetermined to stand alone, and be considered singular, rather than meddle with another man's property); and yet, probably there was no great harm in complying with the customs tolerated by "the better sort" of the people of Upper Canada.

No sooner were these matters concluded, than wine and its accompaniments were handed round to the company, and gladness seemed to brighten up every countenance. Apparently the clergyman was "master of the ceremonies;" for nothing seemed to be done without his sanction and approbation. Probably about an hour was passed in discussing the wines and the gossip of the district, when tea and coffee were handed round to the company, and shortly afterwards the major and the minister's lady placed themselves at the head of a country-dance. The reverend gentleman descended not from the dignity of his sacred character in joining in the mazes of the giddy dance; but, with few exceptions, the whole company partook of the *jumble*, for there was not sufficient space for one-third of the number to *dance* in. About twelve o'clock dancing was suspended in order to do justice to a sumptuous cold collation (sumptuous for the country where it took place), that Mrs. W——n and her friends had provided; when, that being over, the dancing was again resumed, and continued with much spirit until four or five o'clock in the morning, when the reverend minister announced that it was time to discontinue it, and the whole of the company assembled, except the reverend gentleman and his lady, acting upon the hint, betook themselves to their respective homes, highly gratified with the gay doings at the humble cottage of Major W——n.

In the interior of the United States, apart from the towns and cities, most of the marriages are performed by the civil authorities, since marriage is generally considered as a civil rather than a religious contract; and hence the very great number of divorces that annually take place. For the most part there is is very little show or festivity on those occasions, although it sometimes happens that a small party is invited to the residence of the parents of either the bride or bridegroom, in order to meet the newly-married couple on their return from the squire's, where they have been to have the marriage ceremony performed.

Some years ago I happened to be present at the house of a magistrate in Indiana, the keeper of a "house of entertainment;" when a little after the evening had closed in, a young man and woman waited upon the squire for the purpose of being married. After some half-hour's conversation between the squire and the young man, respecting "chopping, logging, and burning of fallows," and between the young woman and the squire's daughters concerning "quiltings and camp-meetings," the youth at length mustered the resolution to hint pretty broadly to the functionary the business which he and his companion had "called in" upon. The squire was not slow in intimating his willingness to proceed to business immediately; when the young man "guessed" that he wished previously to make him acquainted with one little particular which he calculated he had better first explain. The little particular amounted to this,

that they were unprovided with the cash necessary to discharge the usual fee; and without the squire would either take his "note of hand," or else give him a "little job of work," he was afraid that there might be some little difficulty. The squire, however, soon settled this point satisfactorily; for he informed his young neighbour that his father had previously applied to him on the subject of his (the son's) marriage, and representing to him the scarcity of cash, he had agreed to receive his fee or demand in wheat. Whereupon the happy youth gave the magistrate a nod of approbation, ejected the tobacco-juice, quid and all, into the corner of the fire-place, cast a sly look on the seemingly quiescent maiden, and then springing from his seat said, with considerable energy, "then I guess we be ready to be spliced." The "splicing," as he called it, was soon over; for after the squire had asked two or three questions relative to their ages, names, &c., he put the main questions, namely, "Will you have this woman for your wife?" and, "Will you have this man for your husband?" which having been duly answered by each party with a "Yes," accompanied by an affirmative nod, he declared, in the presence of his family and myself, that the parties were now and henceforward lawful man and wife. After the newly-married couple had been treated to "a drink" of boiled cider, the squire seeing that they were about to depart, addressed the young man with,—"I say Mr. ——, I guess you might as well tell the old captain (the young man's father) to let me have the wheat by to-morrow at sun-down, as I calculate on going to mill the next day, and might, as well as not, take it along with me."

The young couple set out for their respective homes, apparently as unconcerned and uninterested as they seemed when they arrived; and I could not help thinking that a couple of bushels of wheat, worth six or seven shillings, was the most weighty consideration in the whole business. J. B. B.

SPLENDID APPEARANCE OF JAMAICA.

THIS beautiful isle, happily screened by Cuba and Hispaniola from the tempestuous winds of the Atlantic, and peculiarly adapted for an extensive and profitable commerce with the adjacent continent, by reason of the number and disposition of its excellent havens, is really one of our most valuable colonies. Jamaica is somewhat of an oval shape, with an elevated ridge, called the "Blue Mountains," (towering in some places to nearly eight thousand feet above the level of the sea,) running longitudinally through the isle east and west, and occasionally intersected by other high ridges, traversing from north to south; approaching the sea on the south coast in gigantic spines of sharp ascent—difficult of access, and clothed with dense and sombre forests;—on the north declining into lovely mounds and round-topped hills, covered with groves of pimento, and all the exquisite verdure of the tropics,—the *coup d'œil* presenting a splendid panorama of high mountains, embosomed in clouds, and vast savannahs or plains, hills and vales, rivers, bays, and creeks. The midland is spread for an extent of many miles with an infinite number of round-topped hills, whose surface, covered with a loose lime-stone, or honey-combed rock, is clothed with fine cedar and other trees, of enormous bulk; the dales or cock-pits meandering between these hummocks contain a rich soil, of great depth, where the succulent Guinea grass forms a perfect carpet of ever-verdant beauty.

When viewed at a distance from Point Morant (the southernmost high land on the coast), the picture is splendid; the Blue Mountains appear above the stratum of clouds which roll along their precipitous sides,—beneath, the rugged hills are furrowed with ravines, and steep cliffs descend abruptly to the sea, and on a nearer approach lofty forests are seen, and slopes of bright, emerald green.—*MARTIN'S West Indies.*

VITRIFIED FORTS OF SCOTLAND.

II.

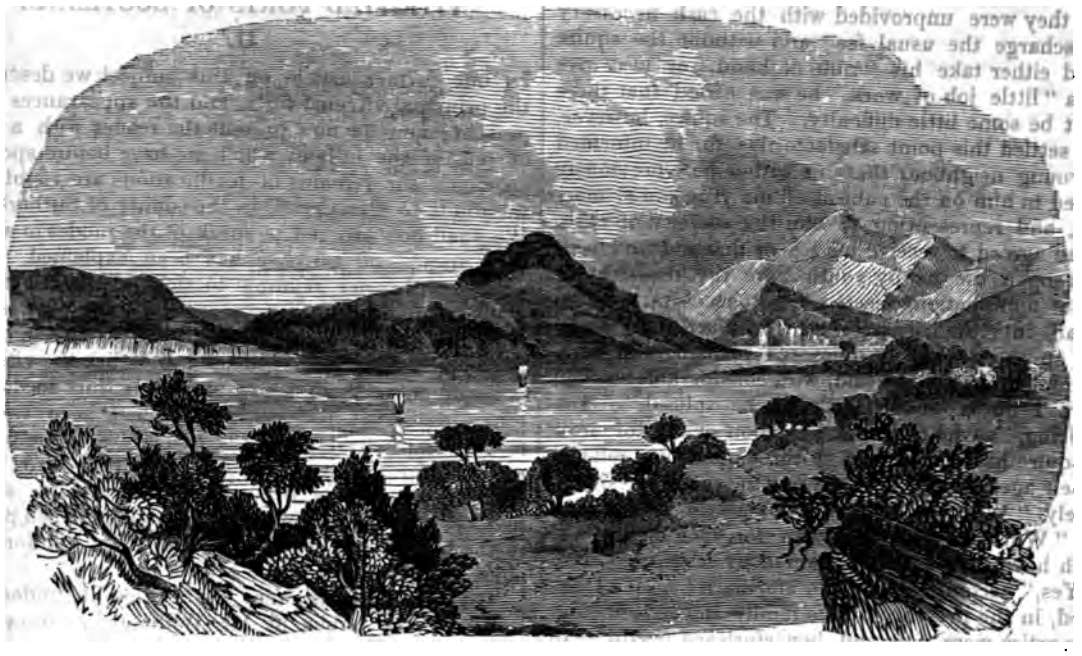
IN our former article on this subject we described the principal vitrified forts, and the appearances they present; and we now present the reader with a view of one of the hills of which we have before spoken, on which the remains of fortifications are visible:—we allude to *Dun Creich*, in the county of Sutherland. We shall now proceed to speak of the modes in which their origin and purpose has been explained. The principal theories relating to this subject are three; viz., 1st. That fire had been used for the purpose of cementing the walls of the forts, by fusing the materials of which they are made; and that the vitrified appearance which they now present is thus accounted for. 2nd. That the vitrification had been caused, not in the *erection*, but in the *destruction*, of the buildings, of which we now see only the ruins. 3rd. That the vitrification has been caused by making signal fires on the hills, during an early and disturbed period in the history of Scotland. These three opinions we shall treat of in the above order.

The vitrifications were first brought under the notice of the public by Mr. Williams, a surveyor in Scotland, in 1777, and two or three years afterwards Dr. Anderson, in the *Archæologia*, made further remarks upon them. He says,

> These walls consist of stones, piled rudely upon one another, and firmly cemented together by a matter that has been vitrified by means of fire, which forms a kind of artificial rock, that resists the vicissitudes of the weather better perhaps than any other artificial cement that has ever yet been discovered. All the walls of this kind that I have yet seen or heard of, have been evidently erected as places of defence. They, for the most part, surround a small area on the top of some steep conical hill, of very difficult access. It often happens that there is easier access to the top of one of these hills at one place than at any other; and there they have always had the entry into the fort, which has always been defended by outworks more or less strong, according to the degree of declivity at that place. If the form of the hill admitted of access only at one place, there are out-works only at one place; but if there are more places of easy access, the out-works are opposed to each of them, and they are proportioned in extent to the nature of the ground.

Dr. Anderson proceeds to remark, that it appears surprising at first sight, that the natives should have been capable of discovering a cement of such a singular kind as this is;—that it is less surprising that the knowledge of it should not have been carried into other countries, as distant nations in those periods had but little friendly intercourse with one another; but that it is no difficult matter for one who is acquainted with the nature of the country where these structures abound, to give a very probable account of the manner in which this art has been originally discovered, and of the causes that have occasioned the knowledge of it to be lost, even in the countries where it was once universally practised. These remarks are evidently due to an opinion that the vitrification was the designed effect of the builders of the forts.

He advances his hypothesis thus:—Having made choice of a proper place for a fort, the builders would rear a wall all round the area, building the outside of it as firm as they could of dry stones, piled one above another, the interstices between them being filled with a vitrescible iron ore, which abounds in the northern parts of Scotland. When the wall was thus far completed, with its facing all round, reared to the height they wished for, nothing more was necessary to give it the entire finishing, but to kindle a fire all round it, sufficiently intense to melt the vitrescible ore, and thus to cement the whole into one



VIEW OF DUN CREICH, IN THE COUNTY OF SUTHERLAND.

herent mass, as far as the influence of that heat tended. As the country then abounded with wood, is purpose would be readily effected by building a ıck of wood round the whole outside of the wall, d then setting it on fire. It was probably with a view enable them to build this stack of wood with the eater ease, and to suffer the fire to act more forcibly .d equally upon the different parts of the wall as it adually consumed, that they were induced to in- ne the walls so far from a perpendicular position. an after period, when the woods had gradually en destroyed, and before it was well known how to anufacture peat for fuel, it would be such a difficult atter to procure fuel in abundance, that buildings this kind would come to be disused, and the art, a short period, among a people ignorant of letters, ɔuld be entirely forgotten.

Mr. Tytler in a communication to the Royal Society Edinburgh, states his opinions somewhat as llows:—The buildings reared by the ancient inhabit- ıts of this country, both for habitation and defence, ɔuld naturally be composed of such materials as the .de state of the country presented in abundance, ıd such as required little either of labour or of skill bring into use. In those quarters where stone could : easily quarried into square blocks, or where it splits to laminæ, no other material than the simple stone as necessary, and very little labour was sufficient to ar the structure. But where the stone is of such nature as not to be easily split into square blocks, separated into laminæ, but breaks into irregular agments, it would be difficult to form a regular ructure of such materials alone.

The mode in which the fabric was built in the latter ıse was, probably, by employing wood as well as one. The building was begun by raising a double ıw of palisades or strong stakes, in the form of the tended structure. These stakes were, probably, arped across by boughs of trees, laid very closely gether, so as to form two fences, running parallel to ıch other at the distance of some feet, and so close to confine all the materials, of whatever size, that ere thrown in between them. Into this intermediate ıace were probably thrown boughs and trunks of ees, earth and stone of all sorts, large or small as ıey could quarry or collect them. Very little care would be necessary in the disposition of these materials, as the outward fence would keep the mound in form. In this way it is easy to conceive that a very strong bulwark might be reared with great dispatch, which, joined to the advantage of a very inaccessible situation, and that improved by artful contrivances for increasing the difficulty of access, would form a structure capable of answering every purpose of security or defence.

The most formidable engine of attack against a structure of this kind, would be fire; and this, no doubt, would be always attempted, and often successfully employed by a besieging enemy. The double ramparts, at a considerable distance from each other, and the platform at one end, were certainly the best possible security against an attack of this kind. But if the besiegers prevailed in gaining an approach to the ramparts, and surrounding the external wall, set fire to it in several places, the conflagration must speedily have become general, and the effect is easy to be conceived. If there happened to be any wind at the time, to increase the intensity of the heat, the stony parts could not fail to come into fusion, and, (as wood burned away,) sinking by their own weight into a solid mass, there would remain a wreck of vitrified matter, tracking the spot where the ancient rampart had stood; irregular and of unequal height, from the fortuitous and unequal distribution of the stony materials of which it had been composed. The appearance at this day of these vitrified mounds creates the strongest probability of the truth of this conjecture.

This, then, is the second theory. We proceed to the last,—that of Sir George Sinclair.

He supposes that, for fear of an invasion, or any hostile attack, the natives were accustomed to burn fires on the hills, so as to serve as beacons of communication from one part of the country to another, and that the fires thus kindled vitrified the surface of the stones near them. To be satisfied of the reason why the signal fires should be kindled on or beside a hide of stones, he considers that we need only imagine a gale of wind to have arisen when the fire was kindled on the bare ground. The fuel would be blown about and dispersed, to the great annoyance of those who attended it. The plan for obviating the inconvenience thus occasioned, which would

most naturally and readily, would be to raise a heap of stones, on either side of which the fuel might be placed to windward. To account for a large extent of vitrified matter in a line or semicircle, it is only necessary to allow the inhabitants of the country to have had a system of signals. A fire at one end might denote something different from a fire at the other, or in any intermediate parts. On some occasions, two or more fires might be necessary, and sometimes a fire along the whole line.

It seems evident to the same writer, that the people who formed the structure on Dun Creich had no idea of applying fire for the purpose of strengthening the ramparts, and had not even taken the hints afforded them by the effects of the signal fires. Hence the appearances at this place seem to demonstrate the fact, that the vitrifications have been occasioned by the lighting of signal fires, to warn the inhabitants of the approach of an enemy, or to convey the orders of a chieftain to his dependants. It appears, too, that such signals have been common after the use of lime mortar was known, since we find on this hill the remains of a building constructed with it. This may have served the double purpose of a watch-tower, and the habitation of the people who had charge of the station. At the head of the valley are the remains of an old castle, with which the station was probably connected. These signal fires were within sight of one another, throughout a long range of hills.

Here, then, the reader is presented with three different modes of accounting for the same phenomenon. All the writers speak from personal inspection of the objects, and therefore are worthy of attention independent of their high character. We think, therefore, that the true mode of accounting for the vitrified forts has yet to be determined.

THE ART OF JAPANNING.

I.

THERE is no country in the world better deserving of notice than Japan; and there is no people (not even the Chinese) more remarkable for their strict seclusion than the Japanese. This nation, we know not how many centuries ago, attained a wonderful degree of refinement in the arts and discipline of life, in which it has probably never since progressed. The complete state of insulation in which it holds itself from other nations has been favoured by nature; for the three islands which form the empire of Japan, present difficult rocky boundaries to a stormy sea. This country is rich in mineral and botanical productions, and may be said to support itself without any commercial aid from other nations.

Those Europeans who have, from time to time, attempted to settle in the country for commercial purposes, have been treated with the greatest severity, and in many cases have been put to death. The Dutch only have been tolerated; and they are under the most severe restrictions, and are even constantly exposed to danger. They are allowed a small corner only of the port of Nangasaki, in the Kinsin isle, where, enclosed in a sort of prison, and subject to every sort of mortification and humiliation, they are allowed to dispose of two cargoes annually. They import various articles of colonial produce, spices, and hardware, in return chiefly for the admirable, and indeed unrivalled, copper of this country; together with some trifling articles of japanned and lackered wares.

The Japanese are said to excel in agricultural pursuits; but they do not equal the Chinese in the manufacture of silk, cotton, and porcelain. They are well acquainted with the metallurgic arts; the fabrication of arms, and the making of glass; and there is one art in which they excel all the rest of the world; that of covering thin vessels with a rich, dark, varnish, and raising above it artificial flowers and ornaments.

This art is called by the Europeans JAPANNING, from the name of this country, whence the art was first introduced into Europe. This art is also practised extensively by the inhabitants of China, Siam, and other eastern parts of Asia; and we now proceed to give an account of its processes, as adopted in Europe, and, as far as is known, in Japan, &c.

Japanning, as we have said, consists in covering articles of wood, metal, paper, &c., with various pigments and varnishes, in a peculiar manner, so as to preserve and ornament them. The colour thus given is sometimes uniform; sometimes variegated, so as to represent marble, tortoise-shell, or scarce woods; and sometimes a black ground is relieved by coloured figures, so as to produce a kind of painting, and these figures are often gilded or silvered. But the principal characteristics which distinguish japanned work are its great hardness, and very high polish.

The method of Japanning, as practised by the above mentioned eastern nations, differs greatly from that of Europe. The principal cause of this difference is that the former possess a tree, producing a kind of varnish which is the chief substance used by them in japanning. It is collected (like Indian rubber, and many other similar substances) simply by making an incision in the lower part of the trunk, and the varnish flows out. It has at first the colour and consistence of cream; but to render it fit for use it is poured into a large shallow vessel, and stirred for several hours, that every part may be equally exposed to the air. This causes it to turn perfectly black; a quantity of finely powdered charcoal is then added, and it is fit for use. The article to be japanned first receives one or two thin and even coats of this substance, which, after being dried in the sun, soon becomes excessively hard. It is then polished with water and a smooth kind of stone, until it is as smooth and bright as glass. As far as this, the process is the same, whatever colour or pattern is required. Another kind of varnish is now used, composed of turpentine and a peculiar oil prepared by the Japanese. If the article is to be of a uniform black colour, this varnish is simply laid on without any admixture, and being transparent, it allows the first varnish, which is of a black colour, to be seen through it. The process is then complete. But if any other colour except black be required, the pigment, which must be an opaque one, is mixed with this second varnish, and laid on with great care, to preserve it even and smooth. But one of the most common kinds of japanned work is that in which gold or silver figures are produced on black ground. This is done before the final varnish is laid on. After the black ground has been polished, the figures are drawn on it with the same varnish as that afterwards used. Before this is quite dry, the gold or silver leaf is laid on, and adheres to the damp figures, but not to the dry surface surrounding them. The superfluous gold or silver leaf which does not adhere, is then removed, and the whole receives the finishing coat as before.

European japanning was formerly performed in the same manner, the peculiar substance used being imported from Japan for the purpose. But an artificial method of imitating the oriental japanned work was discovered, and superseded the eastern method, which, although far superior to ours, in hardness and durability, is very injurious to the workers in it, owing

to the poisonous nature of the juice of the tree above mentioned.

The European method consists, first in laying on a kind of coloured varnish, called a japan ground, which has the property of turning exceedingly hard. It is then painted, gilt, or silvered, if required, and lastly receives several coats of a hard transparent varnish, which is capable of receiving a high polish, and is always laid on over everything else, whether the ground be plain or figured. All these processes we will briefly describe.

Before the japan ground is spread on, a priming is sometimes necessary, if the article be rough, to fill up all the inequalities of surface and render it smooth and even. This is of course always necessary for the coarser kinds of wood, and was formerly used for all substances. But it is now never used, except when the surface is so uneven as to render it absolutely necessary; since it has been found that the work is much more durable when no priming is used; because the japan then adheres more strongly to the substance beneath, and therefore is less liable to crack and peel off. Articles of metal, *papier maché*, and the finer sorts of wood, are therefore never primed.

The priming for common japan work consists of whiting, mixed with very strong size, to such a consistency that it may form an opaque coat on whatever it is laid. For work of a superior kind, parchment size is used, instead of common size; and this is greatly improved by the addition of one-fourth of isinglass, which renders it less liable to crack and peel off. When this priming is used, the article is first covered with a coat of rather weak size, such as the common size, diluted with two-thirds of water, and used hot. When this is dry, the priming is spread with a paint-brush as evenly as possible. The number of coats used is never less than two, and between each, the article is allowed a day or two to get perfectly dry.

Of course the rougher the surface is, the more coats of priming it will require. The method of discovering whether the priming be thick enough, is by rubbing it with a wet rag or sponge, when, if it does not receive a polish, more priming is necessary to make the surface more even. When the priming is found sufficiently thick, the work is ground smooth with Dutch rushes or fine glass paper. It then receives another coat of priming which, when dry, is polished with a moistened rag or sponge, and it is then fit to receive the japan ground.

Leather, metals, *papier maché*, and fine hard wood require no priming; but, before being japanned, they are cleaned, well dried, placed in a warm room, and covered with two or three coats of a coarse varnish, which is laid on with a flat camel's-hair pencil. This varnish is made by dissolving two ounces of seed-lac and two ounces of resin in a pint of spirit-of-wine, and straining it. It must of course be allowed to dry between each coat.

When the article has been thus prepared, it is ready to receive the japan ground, which, when it is to be of one uniform colour, is composed of the proper pigment mixed with a varnish. The varnish commonly used is called shell-lac varnish, and is thus prepared:—"Take of the best shell-lac five ounces, break it into a very coarse powder, and put it into a bottle that will hold about three pints or two quarts; add to it one quart of rectified spirit-of-wine, and place the bottle in a gentle heat, where it must continue two or three days, but should be frequently well shaken. The gum will then be dissolved, and the solution should be filtered through a flannel bag; and when what will pass through freely is come off, it should be put into a proper sized bottle, and kept carefully stopped for use. The bag may also then be pressed with the hand till the remainder of the fluid be forced out; which if tolerably clear, may be employed for coarser purposes, or kept to be added to the next quantity that shall be made." To make the japan ground, any kind of pigments may be mixed with this varnish, in such proportions as to produce the required colour, but they must first be ground very smooth with spirit-of-turpentine.

When the colour of the ground is required to be very brilliant, it is not mixed with this varnish, but with mastic varnish, which is thus prepared:—"Take five ounces of mastic, in powder, and put it into a proper bottle, with a pound of spirit-of-turpentine; let them boil in a gentle heat till the mastic be dissolved, and if there appear to be any foulness, strain off the solution through flannel."

The method of making and using the different coloured grounds will be described in the next article on japanning.

ON THE DEFENCES OF ANIMALS.

In many land animals, under all forms, the sole defence is the power of escape, though weapons are sometimes superadded. In the hare, it is the defence against superior strength; the power of the fore-paws is efficient against the smaller enemies. In the Deer tribe it is the true, and, except under extreme danger, the only defence; in the Horse family, and the camelopard, the instinct and the power of using the hoofs are superadded. In the natural state, the fleetness of the sheep, aided by the watchful and posted centinel, and added to a power of climbing, like the goat, where few animals can follow it, constitutes the general defence against single animals of prey. The instinct to fly is always added to the power of escape: so regularly are the powers and the propensities for ever associated.

Few weapons of defence have been provided for the birds; and such as they are, being limited to spurs on the legs, rarely on the wings, and still more rarely on the head, they seem intended for the same peculiar uses as the horns of the deer, belonging to the polygamous tribes. The power of flying is an ample defence against the purely terrestrial animals, as it is such even against their carnivorous fraternity: a very small number only, in the falcon family, having the power of taking their prey on the wing, and this with much difficulty.

This also is the great mode of defence in the flying insects; while the velocity and the rapidity of their angular motions render it effectual against most enemies; few but the bat, the swallows, and the nighthawk, with their own peculiar tyrant the dragon-fly, being able to contest in flight with them, as neither of those could succeed in securing them, were it not for their capacious mouths. In the fishes, velocity is equally the predominant defence, though many are also provided with defensive weapons. Here, this power becomes especially effective, from that disposition of colour, which renders them invisible, by changing their level with respect to the pursuer, and from the imperfect vision at long distances, which follows from the deficiency of light in the sea. Perceiving also that the more voracious fish are ill constructed for rapid motions, as is the gurnard for example, and that the smaller species of the shark tribe, though better formed, are exceedingly sluggish.

If velocity is a passive system of defence, concealment forms another. The instinct of burrowing unites habitation with defence. In the rabbit, the badger,

the fox, and more, this is familiar; and it occurs in birds, in the well-known instances of the puffin and the sand-swallow. The owl of South America is permitted a joint territory in the burrow of the *Lepus viscaccior*. Many animals which do not burrow, inhabit natural crevices or caverns; as the fox, showing the power of reason over an instinct, declines digging in the rocky situations where it can find a convenient hole. The excavation made by a sparrow, the nests of the swallow and the wren, and the much more remarkable suspended ones in hot climates, are other instances of united defence and dwelling, which natural history can easily extend. In the fishes, the burrowing of the eel and others may be simply the pursuit of food; but the flat fishes conceal themselves in this manner, under alarm, and with great rapidity. That the inhabitants of the weedy and rocky shores make use of this defence is well known to fishermen, and very remarkably in the case of the loach, enticed from its hole by music; as seems also to occur in the trout. It requires all the silence and cunning of the oyster-catcher to surprise the limpet; and nothing short of the vegetable patience of the actinia could continue to insinuate a tentaculum within the obstinate cover of a periwinkle. The razor-fish and the cockle, burrow, in addition, safe from all but the sand-eel; and the pholades, with shells too feeble and too open for defence, are protected in the caverns which they have been taught to excavate in the rock.

In the crustaceous marine animals, and in the insects, the same system of defence prevails. The shells are more than habitations, since they are both skin and bone to the animal; but they are often defences withal, and very effectual ones. The cod swallows a small crab, but it cannot break the shell of that which is too large for its mouth. The beetle tribe, very widely, may be trod on without injury; and we rarely kill an ant by walking over their armies, unless it be on a very smooth and hard gravel-walk. The forest-fly, as all know, defies a strong hand. Among these also we find the system of burrowing, and that of concealment in natural cavities or otherwise, very widely spread. The crab burrows in the sand, the lobster hides itself in the crevices of rocks, in addition to the security derived from its hard covering and its defensive weapons. Thus also do the brown shrimps conceal themselves in the mud, and the horned ones among the weeds; as this mode of concealment pervades all the lower marine tribes very widely.

In the proper insects, or rather in the parent worm, the structures formed by some of the sub-aquatic larvæ, out of gravel or fragments of sticks, are the most remarkable, being habitations and also defences. The sabella, uniting sand in the same manner, may be associated with these. The hermit crab also may take its place here, since the empty shell which it chooses is equivalent to the den of the fox; but the burrowing insects and worms are so numerous, that no examples need be given: to hide, in this manner or in natural crevices, may be viewed as a sort of universal defence for the race at large.

A mode of concealment through colour is the most universal of all the systems of defence, and it pervades all the races of animals. In the hare its efficacy is well known, as is the consciousness of the security which it affords. But in the quadrupeds, this is much less resorted to than in the birds, where it appears intended to deceive the predatory animals of their own class, rather than those of the earth. In the partridge, the quail, the woodcock, the snipe, and more, the conformity of the colours to the ground is such as to conceal the animal from every eye, even from the acute sight of their enemies, the kite and the hawk. Thus do the smaller birds deceive them, even where the apparent conformity of colour is not great; since we often see the hovering hawk abandon its pursuit, although the expected prey has not escaped. Under this system of defence, as under all others, the animals seem perfectly informed of its nature and value, as the chamelion is in its voluntary changes of tint; and thus, apparently, do the lark and other small birds shift their position under the hawk's eye, till they find the colour which they know to be efficacious.

The same mode of defence has been given to the fishes. In the whole of these, the under part is white while the upper is covered in some manner; or the exceptions at least are rare, occurring also in those which seem to reside always among sea-weeds, where the purpose of colouring the whole body is the same. In the high-swimming kinds, moreover, the whiteness beneath is brilliant, while it becomes a dead and dull one in those which seek the bottom or are compelled to reside there. The object of the variation, as well as of the primary contrivance is apparent, on reflecting that the enemy from below views them against the light of the sky, and that this light diminishes in intensity as it passes through a body of water. It is probable that the fishes can as little see each other in this direction, as we can discern them from above.

In insects, the defence through colour is often the only one which they possess. The green caterpillars, grasshoppers, and aphides, are among the most obvious examples, as their chief enemies are the birds. But the contrivances for concealment are carried even further in some insects; enabling them to imitate form as well as colour. Some caterpillars erect a part of their body, when adhering to a tree, so as to resemble buds, or the stumps of branches; another is so like the black flowers of the sedges on which it reposes, that the sharp-sighted birds often pass it over; and others resemble a dry leaf; while every collection displays those singular imitations of leaves and sticks, which occur, among others, in the phasma, a former source of wondering tales.

But analogous modes of concealment, more or less departing from those, are numerous and various. Many insects cover themselves with sand, chalk, dust, or other substances which they inhabit, thus escaping notice; as some of them also use these masks for the purpose of ensnaring their prey. A domestic cimex dresses itself in fragments of wool and feathers; the cancer phalangium cuts off the leaves of a small fucus, and fixes them on its long hairs, so that even a practised botanist may take it up as a specimen of the plant. In this case, however, the purpose seems to be rather stratagem than defence; it is a trap for shrimps, but it is applicable to both objects. Natural history must however be consulted on the subject of stratagems, since it possesses no peculiar interest for the present purpose.

[Abridged from MACCULLOCH's *Proofs and Illustrations of the Attributes of God.*]

SOME plants discover a peculiar susceptibility of atmospherical agencies. If the Siberian sow-thistle shuts at night, the ensuing day will be fine; if it opens, it will be cloudy and rainy. If the African marigold continues shut after seven in the morning, rain is at hand. The Convolvulus Arvensis, Calendula Fluvialis, and the Anagallis Arvensis, or Poor Man's Weather-glass, close on the approach of rain. —LOUDON's *Enc.*

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WESTMINSTER HALL AND ITS HISTORICAL ASSOCIATIONS. I

INTERIOR OF WESTMINSTER HALL.

"ORIGINALLY built by King William Rufus," says Mr. Britton, "strengthened and enlarged by Richard the Second, new fronted and repaired early in the reign of George the Fourth, and internally renovated, in respect to its stone-work, within the last two years, this magnificent structure forms one of the most imposing objects in the British metropolis; and whether considered in respect to its national associations, or to the skill and science displayed in its construction, it is alike interesting to the historian, the architect, and the antiquary."

This noble Hall, as most of our readers are probably aware, is situated in Palace Yard, and forms one portion of an extensive cluster of buildings, appropriated as courts of law, houses of parliament, &c. Its interior length, from north to south, is 240 feet—breadth, from east to west, 68 feet—and height about 90 feet. The timber-framed roof of this edifice has been for centuries an object of admiration, for the skill displayed in its construction. The timbers are all exposed to view: "the architect," as has been observed, "did not attempt to conceal this roof with a ceiling; but, justly proud of his ingenuity in construction, exposed the whole to view, carved and ornamented on all the more prominent parts."

The hall now presents a spacious, unencumbered appearance; but a considerable space at the south end of it was occupied, a few years ago, by the Courts of Chancery and King's Bench, which were separated from each other by a flight of steps, and a passage communicating with a landing-place, leading to the House of Commons. There was, during the early part of last century, a range of counters, book-cases, &c., running up each side of the hall. These were hired by book and print-sellers, mathematical instrument-makers, haberdashers, sempstresses, &c., who carried on their respective occupations within the spacious area of the hall. These trading purposes to which the hall was applied were gradually discontinued; but it was not till 1820 that the law-courts were removed from the body of the hall. In that year a range of buildings was commenced on the west side of the hall, by Sir John Soane, the entrances to which are by seven large doorways in the west wall of the hall. These doorways lead to the Court of Chancery, the Vice-Chancellor's Court, the Courts of King's Bench, of Common Pleas, and of Exchequer, the Bail Court, and other offices. These various courts, which were finished in 1825, were erected on the site of the old Exchequer Court, and other offices. We must now proceed to speak of the history and origin of this noble hall.

It is a characteristic feature of all ancient palaces

to have a great hall, which was to be used for banquets, meetings, and other ceremonies, in which the baron or lord of the palace met his retainers, knights, &c. Now Westminster Hall was the great hall of an extensive palace once existing at Westminster, and which comprised within its limits many of those buildings and apartments, some of them presenting beautiful specimens of architecture, which were destroyed at the burning of the houses of parliament, in 1834. We may probably hereafter direct the reader's attention to other parts of the noble pile, once forming the palace; but we must at present confine ourselves to a notice of the hall.

The first mention of the hall occurs in the reign of William Rufus. Matthew Paris, speaking of the year 1099, says:—"In the same year, King William, returning to England from Normandy, held for the first time his court in the *New Hall* at Westminster. Having entered to inspect it, with a large military retinue, some persons remarked that 'it was too large, and larger than it should have been:' the king replied that 'it was not half so large as it should have been, and that it was only a *bed-chamber*, in comparison with the building which he intended to make.'" Another old writer, speaking of the same monarch, says:—"The kynge filled the spiritualtie and temporaltie with unreasonable taskys, and trybutys, the which he spent upon the *Towre of London*, and the makynge of *Westmynster Hall*." During its construction he had to go to Normandy, and had "moche payne to rule the Normans, for they rebellyd often agayne him;" and on his return, "when he saw the Hall of Westmynster y^t^ he had caused to be buylded, he was therwith discontented y^t^ it was so lytle. Wherfore, as it is rehersed of some wryters, he entended, if he had lyued, to have made a larger, and y^t^ to have serued for a chaumber."

From this period the hall was used for the celebration of coronations, meetings of nobles, &c., many accounts of which are to be met with in our old chroniclers. For instance, Holinshed speaks of a feast held there on the occasion of the coronation of Henry, eldest son of Henry the Second, during his father's lifetime, in the year 1170. The coronation ceremony was performed in the Abbey Church, and the feast which succeeded it took place in the hall. "King Henry, upon that daie, served his sonne at the table as server, bringing up the bore's head with trumpets before it, according to the maner. Whereupon, according to the old adage,—

Immutant mores homines cum dantur honores,

the young man, conceiving a pride in his heart, beheld the standers-by with a more stately countenance than he had wont; the Archbishop of Yorke, who sat by him, marking his behaviour, turned unto him, and said, 'Be glad, my good sonne, there is not another prince in the world that hath such a server at his table.' To this the new king answered as it were disdainfullie thus: 'Why doost thou marvell at that? My father, in doing it, thinketh it not more than becometh him: he, being borne of princelie bloude onlie on the mother's side, serveth me that am a king borne, having both a king to my father, and a queene to my mother.' Thus the young man, of an evill and perverse nature, was puffed up in pride, by his father's unseemlie dooinge."

In 1236, there was a feast given in the hall on new year's day, by Henry the Third, to six thousand poor people. Two years afterwards the hall was the scene of a remarkable inundation. On the 10th of February the Thames rose to a great height, the fords became impassable,—the banks were overflowed,—*the mills and mill-dams* were injured, and the meadows and arable land were flooded. Among other effects of the flood was the inundation of the palace at Westminster. The water was so deep throughout the ground-story, that "the middle of the hall might be passed in boats, and persons rode through it on horseback to their chambers. The water, bursting into the cellars, could scarcely be drawn out again."

In 1241, Henry the Third gave a grand entertainment in the hall to the pope's legate, and other distinguished guests. We are told that the king placed the legate at the head of the table, in the royal seat, but not without the envious and angry glances of many of the guests being directed towards him. The king himself sat on the right of the legate, and the Archbishop of York on the left,—many of the prelates and other great men being seated according to the order of their rank and dignity. This little incident will serve to exemplify the power which the pope had over the sovereigns of England in those days. In the same year Henry bestowed the honor of knighthood on Peter of Savoy, the queen's uncle, and then "feasted most sumptuously an immeasurable multitude of guests, on account of this Peter, and to signalize the acquisition of his new dignity."

We must pass over other meetings in the hall, and mention one which took place on the 23rd of November, 1243, on the occasion of the marriage of the Earl of Cornwall, the king's brother, with Crucia of Provence, sister to the queens both of England and France. On this occasion the tables in the hall are said to have groaned beneath the weight of thirty thousand dishes; and one of our chroniclers busied himself in calculating how much space these dishes must have occupied, supposing them to have been only one foot in diameter. But we may crave the liberty of doubting the accuracy of these details, especially as we all know the power of a cipher in numeration.

We hear of Westminster Hall being a seat of justice so long ago as 1269, when a singular incident occurred. John de Warrenne, earl of Surrey, and Sir Alan la Zouche, appeared before the judges in the hall, for the settlement of a dispute about a manor. Instead of leaving the judges to settle the matter, the two antagonists proceeded from disagreement to abusive language, and from that to blows; upon which the domestics of the earl attacked Sir Alan with drawn weapons, pursued him from the hall into the interior of the palace, and desperately wounded him. The king, who was residing in the palace, heard his cries, and came out to him, and ultimately inflicted a heavy penalty on the earl, but could not prevent Sir Alan from dying of his wounds.

Westminster Hall is connected with the very first act of the reign of the next sovereign (Edward the First,) for he was proclaimed there, on the day after his father's death. Sometime afterwards, when his coronation about to take place, the palace at Westminster underwent a thorough repair, and the hall shared in these repairs with the other parts of the building. One of the rolls in the Remembrancer's office speaks, among other repairs, of "the reparation, emendation, and painting of the Great Hall, against the coronation. The roof, which on either side was dilapidated and decayed, was now in some measure amended; and the great exchequer chamber was repaired and amended in like manner."

A remarkable incident is recorded by Walsingham, as having happened in the hall, at Whitsuntide in 1317:—

This year the king celebrated the feast of Pentecost in the Great Hall at Westminster, where, as he sat in the royal seat at table, in the presence of the great men of his

kingdom, there entered a woman adorned with a theatrical dress, sitting on a fine horse with corresponding trappings, who, after the manner of players, made a circuit round the tables, and at length ascended the steps to the table of the king, and laid before him a certain letter: then, reining back her steed, and saluting the guests, she retired as she came. The king had the letter opened, that he might know its contents, which were as follow:—'His lordship the king shows little courtly consideration for his knights, who in his father's time, and in his own, have exposed themselves to various dangers, and have spent or diminished their substance in their service; while others, who have not borne the weight of business, have been abundantly enriched.' When these things were heard, the guests, looking one upon another, wondered at the boldness of the woman, and the porters or doorkeepers were blamed for having suffered her to enter; but they excused themselves, answering that it was not the custom at the royal palace in any way to prohibit the entrance of players, especially at solemn festivals. Persons were then sent after the woman, who was easily found, taken, and committed to prison; and being required to tell why she had acted in such a manner, she truly replied that she had been induced to do it by a certain knight, for a proper reward. The knight being sent for, and brought before the king, in reply to enquiries, nothing fearing, boldly confessed himself the author of the letter, and avowed that he had consulted the king's honor in what he had done. Therefore the knight by his constancy rendered himself deserving of the king's favour, with abundant gifts, and the woman was released from prison.

In another paper we shall bring down these historical details to later dates.

HEAT.

In our present position on the globe, we are indebted, under Providence, to heat for most of our comforts and enjoyments. Nay, our very being, our physical existence, depends upon the presence of this wonderful and powerful agent of nature. Our frame is admirably adapted to the clime which we inhabit, and the varying changes of heat, which constitute all the vicissitudes of climate and seasons we are calculated either to withstand or to enjoy. Heat is the sole cause which sets in motion a thousand sources of exuberance and fertility, producing an universal burst of joy and gladness at the approach of the new-born Spring;—which clothes the earth in its beautifully-variegated Summer robe;—and which prepares the riches of Autumn to fill the storehouses of living creatures, thus providing for that season, when, by a diminution of heat, the earth and the waters are bound up in ice and snow; when the vegetable world is leafless, and fixed in the torpor of apparent death; until heat again becomes present to us in more abundant quantities, (for we must not suppose that heat is entirely absent even from the coldest bodies,) and Spring comes round again. Thus the seasons return with the year, the duration of each being modified by the particular position we may refer to on the surface of the globe.

Heat is everywhere present: it is within us, and around us; it produces the immense varieties of the animal, the vegetable, and the mineral world. The very air we breathe, owes its form and elasticity to heat. Water we know may be a solid, a liquid, or an air, according as heat is distributed in it. By means of heat we get our implements of art, science, or domestic life. Without the artificial aid of heat, our food would be insipid, and often destitute of nourishment. In short, all the offices and contrivances of man, of the other animals and of vegetables, are made with especial reference to this all-pervading principle; and yet Science, which never blushes to own her ignorance, knows absolutely nothing of heat, except by its effects. The cause of heat is unknown; but its effects are most abundant; and these have been collected and generalized with so much industry and scientific skill as to form a distinct science, the study of which is not only useful, but indispensable to any one who desires to investigate the beautiful phenomena of the material world.—Tomlinson's *Student's Manual of Natural Philosophy.*

PARISH SURVEYS

UNDER THE NEW POOR LAW ACT, THE TITHE-COMMUTATION ACT, AND THE PAROCHIAL ASSESSMENTS ACT.

In consequence of the passing of the three above-named acts of parliament, many parishes have found it expedient to have their lands measured and mapped, and accordingly issued public advertisements for competent persons to survey them, and furnish maps and plans, agreeably to the form pointed out by the tithe commissioners for England and Wales.

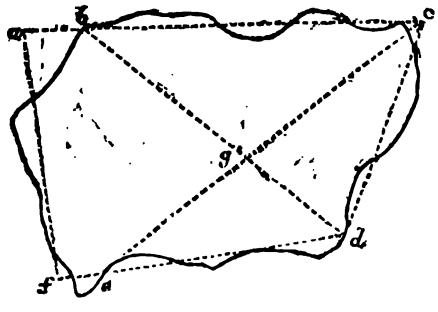
In some parts of the country it now appears that a portion (but rather a small one) of the parishes have been measured and mapped within the last thirty or forty years, some of them by persons fully competent to make accurate surveys, and maps too; and yet in several cases where surveys of this sort have been strictly examined, it has now transpired that there has been gross inaccuracy, or something worse. Formerly, when a parish was surveyed, the inhabitants had no means of testing the principles upon which the work had been performed, nor of examining the length of the lines chained by the surveyor, it being quite optional with him whether or not he acted honestly. But under the operation of the present acts of parliament, the case is different; for the authorities make it a rule that all the measured (chained) lines of the field-book shall be inserted upon the map, in party-coloured ink, the numbers and lengths of the lines being marked thereon accordingly. By this means, when the working plan (as the first or *plotted* plan is called) is sent to the commissioners' office for their inspection and approval, they have only to apply a properly-divided scale to the chained lines in order to test the accuracy of the map-work. But this is not all that they require, for the surveyor's field-book has to be sent in accompanying the map, so that by an inspection of the field-book and a reference to the map, any attempts of the surveyor to accommodate his lines to the dimensions of the paper, or the spaces on the paper to the quantities in the field-book, can be easily detected. Formerly this was the case; for as the surveyor kept the field-book in his own possession, the only method of testing the accuracy of his work was by a re-measurement, a process, in large and expensive surveys, scarcely ever resorted to.

Many persons in the habit of surveying land in moderate quantities, such as separate enclosures, or even small farms, know little or nothing of the principles of practical geometry; and yet the only true theory of land surveying is based upon a series of *triangulation.* In short, it matters not whether it be a parish or a county that the surveyor is engaged upon, since the work, when completed, will be nothing more than a series of triangles, or other geometrical angular figures, based one upon the other. But in extensive surveys it is necessary, or at the least very desirable, that there should be something more than a numerous succession of small triangles, trapeziums, trapezoids, &c., such as are commonly used in measuring single fields or enclosures; and, therefore, a few larger geometrical figures (mostly triangles) en-

compassing the whole, or greater portion, of the lands to be surveyed, are first run out as a sort of *frame-work*, afterwards filling up each of the larger divisions with a series of such small figures as the practised surveyor considers the best adapted for the completion of the whole.

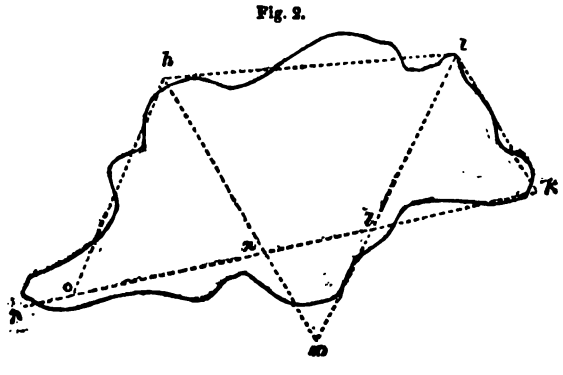
The annexed figures are sketches of two parishes, of different shapes, the black lines indicating the boundaries, and the dotted lines the *frame-work* which a competent surveyor would at the first run out, (provided no obstacle intervened to prevent his doing so;) although it will appear obvious to persons acquainted with such matters, that the lines might have begun, and intersected each other, at other parts of the parish, and yet have answered the surveyor's purpose quite as well, or very nearly so.

Fig. 1.



The practice pursued by many of the most eminent surveyors at present engaged in parish surveys, is that of running *two* diagonals, where the shape and nature of the survey will admit of it, and boundary or *tie*-lines by which the extremities of the diagonals are confined to their proper positions. By this means the main figures represent triangles, or figures which, by running other *proof*-lines, may easily be reduced to such. In this system of triangulation there is no use made of any instrument to ascertain the bearing or angle; for if (as in fig. 1) the extremities of the two diagonals are connected by the line *c d*, all the other points of intersection must agree with the field-book, if the lines have been accurately measured; and the *tie*-line *a f* will prove the whole to be correct.

Fig. 2.



In fig. 2 there cannot properly be said to be any diagonal, since the several dotted lines reduce it to triangles, and the lines *h m*, *i m*, intersecting the boundary line *k p*, with their extremities tied together by the line *h i*, prove the whole of the other lines to be correct, provided the dimensions agree with the field-book. It may be remarked, that although the recently-passed acts of parliament before referred to authorize the surveyor to continue his lines beyond the limits of the parish he is engaged in surveying, "where it is considered necessary," that it is better *to avoid doing so as much as possible*; since farmers *in the adjoining parishes* always consider it a hardship to have their fences broken down and their crops injured, by surveyors whom they consider as having no business whatever with the parishes in which their lands happen to be situated.

The surveyor having reduced to paper the diagram of his main or principal lines, and having ascertained that they all exactly fit and agree, commences the regular field-work in one of the triangles or sections of the diagram, which he completes by piecemeal, before he commences another. Where these sections are very large, he probably will be induced to run several lines across them, in various directions, whereby they become divided into a series of distinct mathematical figures, such as may best answer the purpose for completing the survey in a business-like manner.

The chain (four rods, or sixty-six feet, in length) is the principal instrument in use in the present extensive parish surveys; and it is undoubtedly better calculated for accuracy and despatch than any other instrument. But in large woods, and where the ground is hilly and broken, the theodolite is commonly called into use, otherwise much time and labour would be consumed in cutting *washes* (openings) through the woods, in order to secure by proof or *tie*-lines, those points where the direction or bearing of the lines is necessarily changed. In chaining lines of several miles in length, great care and accuracy are required. Hence the surveyor has to test the length of his chain daily; and without he has old and trustworthy chainmen his attention to his assistants is continually called for.

Since the passing of the acts of parliament, under which the present surveys are executed, it has been ascertained that there is not a sufficient number of practical surveyors in the country to measure and map all the parishes within the time that had been calculated upon by the commissioners under those acts, in consequence of which they are *forcing* but a limited number of parishes upon the immediate attention of surveyors. The common prices for accurate surveys vary from 8*d.* to 15*d.* per acre, according to the situation and nature of the ground, for which, besides the field-work, the surveyor has to supply the stationary, make a *plotted* plan, and *one* or *two finished* plans, according to previous arrangement between the parties. These maps are usually plotted from a scale of three chains to the inch, or 26⅔ inches to the mile. Where it is tolerably good surveying, from sixty to eighty acres may be considered an average day's work; where it is very good, one hundred acres; but where the fences are crooked, and the enclosures small, (including some farm buildings) forty acres is not a very bad day's work. But the field-work is not quite half of the whole performance; for besides plotting the first plan, and making one or two finished ones, the contents of each separate parcel or enclosure have to be calculated by the scale, and a couple of reference-books made out, one for the use of the parish, and the other for the commissioners. When all this has been performed, then the field-books, the reference-book, and the *plotted* plan are forwarded to the commissioners, when they are carefully examined in all their details; and should they be found deficient in accuracy, in any way whatever, they are returned to the surveyor for explanation and correction. And it is not until the commissioners are fully satisfied with the performance that they seal them with their seal of office, and return the plan to be copied, (if that had not been done previously;) and afterwards the field-books, reference-books, and plotted plan, are finally deposited in the commissioners' offices in Somerset House.

J. B. B.

THE CITY OF WASHINGTON, IN THE UNITED STATES.

HOUSE OF ASSEMBLY, WASHINGTON.

THE annexed cut represents the central seat of government for the United States of America, situated in the city of Washington, in the district of Columbia.

The district of which we have just spoken is, in its origin and purpose, a remarkable one. It consists of a small portion of two of the large districts or states, cut off from them, separated from their jurisdiction, and entirely under the control of Congress, or the House of Commons of America. The object seems to have been, to secure the members of congress,—the functionaries of the federal government,—from the local jurisdiction of any single state, and from all collision with its authorities. Consequently, the legislature arranged that a small district should exist out of the control of any of the states; that the inhabitants of this district should not have votes for congress; that they should be under the immediate government of congress; and that the House of Assembly should be built in this district. All which has been done.

The district of Columbia is a square, measuring ten miles each way. The river Potomac runs through the middle of it, and the district consists of a portion taken from Maryland on the north of the river, and another portion taken from Virginia on the south. The whole district contains about forty thousand inhabitants, and three towns, Alexandria, Georgetown, and Washington. It is in the last-mentioned town that the magnificent House of Assembly is built.

The House of Assembly, or, as it is more commonly called, the Capitol, is a building of great magnificence, as the cut will sufficiently indicate. It is situated on rising ground, about eighty feet above the tide-water of the Potomac. It presents a frontage six hundred and twenty-two feet in length, with a colonnade of two hundred and sixty feet, and sixteen Corinthian columns thirty-one feet and a half in height. The elevation of the dome is one hundred and fifty feet, the basement story twenty, the entablature seven, the parapet six and a half. The centre of the building, from the east to the west portico, is about two hundred and forty feet long. The ceiling is vaulted; and the whole edifice consists of solid masonry of hewn stone, which in appearance resembles our Portland stone. The north wing, which contains the senate chamber, has the form of a segment, with a double arched dome, and Ionic pillars. The south wing, containing the House of Representatives, and rooms for transacting business by committees, is of a circular form, adorned with twenty-four Corinthian pillars, behind which are galleries and lobbies for the accommodation of those who listen to the debates. The interior of the building was originally of wood, but stone was afterwards substituted. This magnificent edifice was the joint production of several architects, Thornton, Latrobe, Hallet, and Hatfield.

Stuart, in his *Three Years in North America*, says,—

The more I saw it [the Capitol] the more imposing it appeared. The building covers an acre and a half of ground, and has cost three millions of dollars. The great rotunda, which is ninety-six feet in diameter, by ninety-six feet high, is the principal entrance hall, leading to the legislative halls and their library. The panels of the circular walls are appropriated to paintings and to basso-relievos of historical subjects, of which the landing of the pilgrims in New England, William Penn's treaty with the Indians, the Assembly at Philadelphia, at which the declaration of Independence was signed, the surrender of General Burgoyne, the surrender of Lord Cornwallis, and the resignation of General Washington, are the principal.

At a short distance from the capitol is the house of the President of the United States; a noble building a hundred and seventy feet in length, and eighty-five in breadth.

Some of our readers may not be familiar with the peculiar features of the government of the United States: a few words on this point will not be out of place here. The president and vice-president of the United States are elected for the term of four years, and live at Washington during the sitting of congress; but at other times live where they please. The president's house belongs to the nation, and is held by the presidents in succession; but the vice-president has no house provided for him. The president receives a salary of twenty-five thousand dollars per annum; and the vice-president, five thousand. The president is commander-in-chief of the army and navy, and also of the militia. He is authorized to require, whenever he thinks fit, the written opinions of the various officers of government, on any point of public policy. He has the power, in conjunction with the senate, to make treaties, appoint ambassadors, ministers, consuls, judges, military officers, and other functionaries who are not appointed by fixed laws; for any of these appointments to be valid, two-thirds of the senate must accede to them. He has the power, on extraordinary occasions, to remove functionaries from their offices, without consulting the senate; and he himself is liable to removal from his office by impeachment and conviction of anything which is held to amount to treason.

The congress consists of two parts, a senate, and a house of representatives. The number of representatives amounts to about two hundred, and they are elected every two years. Members must be twenty-five years of age, citizens of the United States, and inhabitants of the states which elect them. The senate consists of two senators from each state, chosen by the legislature for the term of six years. They are not chosen at the same time, but the election is so managed that one-third is chosen every second year. A senator must be thirty years old, nine years a citizen of the United States, and an inhabitant of the state in which he is elected. Both senators and representatives receive six dollars per day during the sitting of congress, besides travelling expenses, which are fixed at the rate of a day's pay for every twenty miles. The public business in congress is almost always prepared by permanent committees, which are appointed by the speaker at the beginning of each session. When a new measure is submitted to congress, it is sent, in the first place, to one of the committees named at the beginning of the session; and the report which the committee makes is in most cases adopted without further discussion. If, however, it be not agreed to at once, and a debate ensue, the time allotted is the period from twelve to three o'clock in the day, unless a special order be made for

continuing the debate for a longer period, which often happens at the end of a session. If many speakers desire to offer their remarks, adjournments take place from day to day; and the same subject may be the sole public matter in dispute for many weeks. But the other public topics are not neglected meanwhile; for the committees sit in the morning and the evening, and arrange and forward those bills which are not the subject of debate. Almost all the members are engaged the whole day, during the session, either in attending committees, or the debates of the house.

It may naturally be supposed, that the city or town where the legislative meetings of the nation are held, must derive an importance from this circumstance, independent of any other; for the senators and representatives from every part of the United States dwell there during the continuance of the session, (which begins early in December, and lasts generally nearly six months.) Washington derives much of its importance from this circumstance, and also much from the excellent plan in which it is built. The streets are arranged in a very singular manner: with the exception of fifteen, the whole of them are arranged due north and south, or east and west, crossing one another at right angles. The fifteen excepted from this rule, point in a direct line towards the fifteen principal states of the republic; the Capitol and the president's house being the points from whence they emanate towards every side of the city. None of the streets are less than ninety feet broad, and one of them, Pennsylvania-street, is a hundred and sixty feet wide, and a mile in length, and reaches from the Capitol to the president's house.

We may observe, in concluding this paper, that as it was found inconvenient to have no fixed meridian line in North America, from which to measure longitudes, a line drawn through the centre of the Capitol at Washington has been made the first meridian for this purpose; and exact calculations have been made of the longitudinal distance from thence to the meridian of Greenwich, from which English reckonings are made.

IF there were any real difficulty in determining the best means of developing the body and preventing deformity, the comparison of savage with civilized man would at once remove it. An intelligent old author, in describing the Caribs of 170 years ago, says, in a tone of regret, "They do not swaddle their infants, but leave them to tumble about at liberty in their little hammocks, or on beds of leaves, spread on the earth in a corner of their huts, and NEVERTHELESS *their limbs do not become crooked, and their whole body is perfectly well made!*" And again, "ALTHOUGH *the little creatures are left to roll about on the ground in a state of nudity, they* NEVERTHELESS *grow marvellously well,* and most of them become so robust as to be able to walk without support at six months old."

The *naïveté* of this expression of surprise at the little Caribs growing MARVELLOUSLY WELL with the assistance of Nature alone, and without the use of stays and bandages, imported from Europe, is extremely amusing, and shows to what extent prejudice and custom, once established, will continue to prevail, even where we have before our eyes the strongest evidence of their being hurtful. Our excellent author seems never to have allowed the thought to enter his head, that the Europeans *produced* the deformity by means of swaddling and bandages, and that the Caribs *escaped* it, simply by avoiding its causes, and giving liberty to both body and limbs.—COMBE.

LABOUR is become necessary to us, not only because we need it for making provisions for our life, but even to ease the labour of our rest, there being no greater tediousness *of spirit* in the world than want of employment and an *inactive life.*—*JEREMY TAYLOR.*

THE SEAT OF WAR IN THE EAST.

I. AFGHANISTAN.

THE various tracts of country which are already, or may yet become, the theatre of a war between the Anglo-Indian army, and that of native tribes, are of a highly diversified character. Mountains, whose summits are the highest discovered land in the world; sandy deserts, surrounding flourishing towns and busy populations, with extensive remains of the architectural grandeur and magnificence of ancient nations, combine to render the country between Hindùstan and Persia one possessing the highest claims to attention and interest.

The principal encampment of the British army is at present on the banks of a tributary stream of the Indus, called the Sutledge, in Punjab, a kingdom which, with the Sinde, or Indian Delta, forms part of the western limit of British India. The territory in dispute, however, is Cabùl, or that portion of Afghanistan the furthest from the Anglo-Indian Empire. Hence, should the war be continued, the following places will be involved in it.

1st. The country of the Afghans, which includes Cabùl; 2nd. Beloochistan; 3rd. Sinde; 4th. Punjab; through which two last places flows the river Indus. Of these districts it is our purpose to give a rapid topographical sketch, and then afford some account of the people who inhabit them.

AFGHANISTAN is divided almost solely according to the tribes distributed over it. The most powerful of these are the *Berdooranees,* the *Ghilgies,* and the *Dooraunees.* The whole territory is enclosed between that western portion of the immense Himalaya chain which is called Hindoo Koosh, and rising above Cabùl is its northern boundary, dividing it from Bokhara; the river Indus limits the Afghan country on the east, the Arabian sea on the south, and on the west it is divided from the Persian empire by a winding line, drawn along the desert boundaries of Kerman and Khorassan.

The whole country may be shortly described as consisting of mountains, rapid rivers, and high tablelands, in the north,—of sandy and salt deserts on the south. The mountains which, continuing in one unbroken chain, form the whole of its northern boundary, have no parallel in any other region of the globe. Their summits are covered with perpetual snow, though only in the thirty-fourth degree of latitude; the most elevated of them which has yet been observed rising to a height of 20,593 feet. The whole of this stupendous range has not been as yet explored; and it is thought that the same chain extends without interruption westward, till it links with Mount Elburz, and thus joins the Taurus and Russian Caucasus.

Other mountain lines traverse in every direction the territories of Cabùl and Beloochistan, always proceeding from the main one. The southern regions *Seistan, Beloochistan,* and *Mekram,* consist partly of mountains, low but rugged, and partly of vast deserts of loose sands.

To this bare outline of the physical features of Afghanistan, we must now add a few particulars concerning the various tracts of which it forms an aggregate. Commencing nothward, the first place of consideration is

HERAT, which, with some portion of country around it, properly belongs to the Persian province of Khorassan, but now possesses an independent government, under Shah Kamroum, who belongs to a dynasty claiming the sovereignty of the kingdom of Cabùl, at present usurped by Dost Mohammed Khan.

Herat is the finest and most populous city in this district. It is situated on an elevated, extensive, and fertile plain, and is the emporium of trade between Persia and the east, which is chiefly carried on by 10,000 Hebrews and 600 Hindoos, who inhabit the city. It is well fortified, as recent events have proved; having resisted with effect the efforts of a Russo-Persian army to besiege it.

The Province of Cabul is chiefly occupied by the Afghan tribe of the Ghilgies, though the Dooraunees are masters of the country. The *City* of Cabùl is the capital of all Afghanistan, and is reckoned one of the most delightful in the world. It is situated on a large well-watered plain, 6000 feet above the level of the sea, over which are scattered innumerable villages, the Cabùl river and three rivulets running through it. Cabùl is a busy bustling city, and boasts of a bazaar almost unrivalled, for it contains no fewer than 2000 shops. The houses are mostly built of wood, on account of frequent earthquakes. The gardens surrounding the city produce the most delicious fruits, which are exported, chiefly to India.

The town is encompassed on three sides by hills, and on one of these is the tomb of the emperor Baber, adorned with large beds of flowers, and commanding a noble prospect. On another eminence is the palace of Dost Mohammed Khan, which is also delightfully situated. The population of Cabùl has been estimated at 60,000 souls.

East of Cabùl is an almost circular plain, about thirty miles in diameter, surrounded by the Hindoo Koosh and Soliman mountains, on every side except to the east, where there is an opening of fifteen miles in width. The beauty and fertility of this plain can hardly be exceeded: well watered, it always presents a verdant aspect; and being preserved in a high state of cultivation, produces a variety of choice fruits.

Peshawur, the capital of Cabùl previous to its late dismemberment, is placed in this valley; it has a circumference of five miles, and was at one time the most considerable town of Afghanistan. Recently, however, it has much declined; and out of 100,000 inhabitants, which were formerly collected within its walls, only 50,000 remain.

The varied costumes which greet the eye of the traveller in the streets of Peshawur, have been likened to a masquerade; for the natives of the surrounding mountains mingled with those of Persia, India, and Tartary, present, in their dresses, a motley contrast, which is not the less picturesque. The houses are built of brick, and are about three stories high; the streets are narrow and slippery, but paved, and have a gutter in the centre. During the spring a portion of Peshawur is flooded, which, at that season, renders it an unwholesome residence.

But the most celebrated of the cities of Cabùl is Ghizni, once the proud capital of an empire that reached from the Tigris to the Ganges. In this city Mohammed, the conqueror of India, placed his throne, and reared the most splendid buildings in Asia; remains of which still bear testimony of former splendour. The most remarkable of these are two lofty minarets, and the tomb of Mohammed. The tombstone is of white marble, and on it is placed the mace of the conqueror, which is so heavy that few men can wield it. Mohammedan priests are still maintained there to read the Koran over the grave.

The present city is but a wreck of the former one. All to be learnt about it is,—that its streets are dark and narrow; the houses, of which there are only 1500, small; and the bazaars by no means spacious.

Bameean, on the northern slope of the mountains, and bordering on Tartary, is a city cut out of a rock, whose cavern abodes are scattered over a surface of eight miles. It contains some remarkable temples with colossal idols.

From Ghizni, one of the most ancient oriental cities, we turn to one of the most modern, Candahar, which, although erected on the site of a town built by Alexander the Great, dates its present origin at no earlier period than 1754, when it was rebuilt by Ahmed Shah, who made it the seat of government, which was removed to Cabùl by Timour Shah, in 1774. Unlike the plan of many eastern towns, that of Candahar is perfectly regular, and is oblong in shape. In the centre there is a circular range of buildings, fifty yards in diameter, surmounted by a large dome; this is the public market-place, and is called the *Choursoo*. Four principal streets are fifty yards in width, all lined with shops, and meet in the Choursoo, their other extremities reaching to the gates of the city. All the smaller streets cross the principal ones at right angles, and are perfectly straight, but narrow, and have a canal running through each of them. The tomb of Ahmed Shah, covered by a gilt cupola, stands near the king's palace, and is held as a sacred asylum, the king himself not daring to take a criminal from it. Though the inhabitants of Candahar are Afghans, they have conformed to the habits of the Persians.

The south-east corner of the kingdom of Cabùl is occupied by the tribe called *Cankers*; they are peaceable, and do not possess the predatory propensities of their neighbours.

The south-west portion of this country forms the province of Seistan, traversed by the river Helmund. Persian stories and songs celebrate this district as one of the finest regions of the East; but at the present time it exhibits a sad reverse. With the exception of a narrow belt along the banks of the river, it consists entirely of sandy plains, over which a few Afghan and Belooch shepherds occasionally drive their flocks. But the traveller readily believes the extravagant praises bestowed upon Seistan by eastern poets, when, at short intervals, he comes upon the remains of extensive temples and the ruins of superb palaces, but which aptly exemplify the scriptural parable of the folly of building houses upon sand. The province is surrounded on every side by those vast deserts that stretch from the Eastern frontiers of Persia; and the wind blowing from thence during a great part of the year, brings with it clouds of light shifting sand, which convert the fields into an arid waste, and gradually bury beneath them gardens, villages, and the monuments of ancient grandeur scattered over the plains. The city of Seistan and the town of Dooshak are situated in this district.

The southern part of the Cabùl territory is composed of a desert of red moving sand, so light and minute as to be almost impalpable; the action of the wind forms it into wall-like ridges of peculiar structure;—one side slopes gradually away, but the other rises perpendicularly, like a brick wall, to a considerable height, and which the traveller must be at the pains to scale before he can pursue his journey.

All to whom want is terrible, upon whatever principle, ought to think themselves obliged to learn the sage maxims of our parsimonious ancestors, and attain the salutary arts of contracting expense; for without economy none can be rich, and with it few can be poor. The mere power of saving what is already in our hands must be of easy acquisition to every mind; and, as the example of Lord Bacon may show that the highest intellect cannot safely neglect it, a thousand instances every day prove that the humblest may practise it with success.—The Rambler.

THE VALLEY OF JEHOSHAPHAT.

THIS ancient burying-place of the Jewish people possesses much interest, on account of its vicinity to and connection with Jerusalem, and also for the very general belief of the Jews to this day, that here the prophecy of Joel (chap. iii., 2—12) concerning the final judgment of all nations, will be literally fulfilled. The followers of Mahomet are also looking for the appearance of their prophet in this identical spot; and it is even said that they have prepared for him a seat on the ledge of a rock, from whence they expect to receive sentence at his hands. This valley has been for ages the favourite burying-place of the Jews, who at the present time will give a large sum of money for permission to inter their dead in the tomb of their fathers. The valley of Jehoshaphat is also called in Scripture "the valley of Shaveh," "the Kings' dale or valley," and "the valley of Melchizedek." It is a deep and narrow glen, on the east of Jerusalem, having on one side Mount Moriah, on the other the Mount of Olives.

The aspect of the valley is sad and desolate: the brook Cedron flows through it from north to south, and shows, by the dull red tint it assumes, that it has partaken of the nature of the soil over which it passes. The name of this brook, and of the neighbouring Mount of Olives, recall to mind the most touching event of all which are recorded in the sacred writings, viz., the bitter suffering and anguish of soul endured by the Saviour of men on the night previous to his crucifixion, an anguish little to be understood *by those who*, not being partakers of his sinless *nature, cannot possibly* conceive of the extent of suffering induced by the imputation of the sins of a whole world, and the wrath of an offended God. The Mount of Olives is barren and sombre in its appearance: here and there a few black and withered vines may be seen on its sides; there are also several tufts of stunted olive-trees, while ruins of chapels, oratories, and mosques, increase the air of desolation with which these scenes are marked.

Among the tombs of the valley of Jehoshaphat, there is one of extraordinary size, which is called "the sepulchre of the Blessed Virgin." It is the largest of all the caves in the vicinity of Jerusalem, and was doubtless hewn out for the burial of some person of distinguished rank, or of high estimation among the people. The traveller Pococke thinks it likely to have been the burial-place of Melisendis, queen of Jerusalem; the authorities for assigning it to the Virgin Mary are very questionable, and it appears improbable that the early Christians should have had it in their power to erect so magnificent a tomb to her memory. In this cave the Christian sects have each an altar, and even the Turks have an oratory. There are also appropriate chapels in the same cave, to mark the supposed tombs of Joseph, the husband of Mary, and of her parents, Joachim and Anna.

The descent to the cave is by a flight of fifty marble steps, each step being twenty feet wide. These are supposed by Dr. Clarke to be of equal antiquity with the cave itself, though no era can be fixed on with certainty as the date of their construction. There are other sepulchres, said to be those of Jehoshaphat, Absalom, St. James, Zachariah, &c., some of them adorned by columns, which appear to support the edifice, but are in fact hewn out from the solid rock into architectural forms. That of Absalom exhibits twenty-four semi-columns of the Doric order, not fluted; six on each front of the monument. The sepulchre of Jehoshaphat, said to have been prepared by order of that king, as the place of his own interment, and from which the valley takes its name, is a grot, the door of which is finely executed, and is its chief ornament.

Across the brook Cedron is a bridge, of a single arch, called St. Stephen's, which is, however, unnecessary during the greater part of the year; for the Cedron dries up, and leaves a perfectly dry channel, excepting after the fall of heavy rains. The barrenness of the whole scene, the silence of the neighbouring city of Jerusalem, the ruinous state of the tombs, with the remembrances connected with this spot, are indeed sufficient to excite a melancholy interest in the valley of Jehoshaphat.

THE general desire for education, and the general diffusion of it, is working, and partly has worked, a great change in the habits of the mass of the people. And though it has been our lot to witness some of the inconveniences necessarily arising from the transition state, where gross ignorance has been superseded by a somewhat too rapid communication of instruction, dazzling the mind, perhaps, rather than enlightening it, yet every day removes something of this evil. Presumption and self-sufficiency are sobered down by the acquirement of useful knowledge, and men's minds become less arrogant in proportion as they better informed. There cannot be a doubt, therefore, but that any evils which may have arisen from opening the flood-gates of education, if I may so say, will quickly flow away, and that a clear and copious stream will succeed, fertilising the heretofore barren intellect with its wholesome and perennial waters.—BISHOP RYDER.

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CHARLES THE FIFTH, EMPEROR OF GERMANY.

HOUSE AT GHENT, WHEREIN CHARLES THE FIFTH WAS BORN.

ORY no where presents a more remarkable in-
e of the insufficiency of human greatness and
: in contributing to present and future happi-
than is to be found in the life of Charles the
emperor of Germany, and king of Spain.

s great prince, warrior, and politician, was born
ent, on the 24th of February, 1500. By a re-
able combination of circumstances, an inheritance
prepared for this prince of vast extent and
:. Through his father, Philip the handsome, he
eir to the archduchy of Austria, the duchy of
ndy, and the earldom of Flanders: through
other, Joanna, queen of Castile, he became the
nptive heir of the Spanish crown, and the ex-
e countries in the western hemisphere, recently
ed to it by the discoveries of Columbus. After
eath of his grandmother, Isabella, his grand-

father, Ferdinand, usurped the regency of Castile; but the nobles compelled him to resign it. The administration was given to Philip, as guardian to his son Charles; but Philip soon dying, Ferdinand became regent; on the death of whom, in 1516, Charles assumed the title of king of Spain, and left the management of this kingdom to the celebrated Cardinal Ximenes, a man to whom Charles owed much of his celebrity. In 1519, Maximilian died, and Charles was elected emperor, at Frankfort. He quitted Spain to take possession of his new dignity, for which he had to contend with Francis the First, king of France. Charles was crowned emperor at Aix-la-Chapelle, with great pomp.

It would be impossible for us, in the brief space which is allotted to us, to supply even a sketch of the life of this extraordinary man: all we can hope to do

is to excite the reader's attention to a period of history which includes so many great events, affecting the whole human race. The greatest of all is, perhaps, the Reformation, which had been begun shortly before Charles's reign, by Martin Luther, an Augustinian friar; and after the coronation of Charles, a diet was convoked at Worms, to deliberate on the religious disputes then agitating Germany. Charles is said to have assisted the Reformation; but the more probable account is that he found his interest in the divisions which the Lutheran principles occasioned, and he never failed to take advantage of them, sometimes against France, sometimes against the pope, and at other times against the empire itself. On one occasion the army of Charles sacked Rome and took the pope prisoner; and the cruelties exercised by his soldiers are said to have exceeded those committed at the downfall of ancient Rome, by the barbarians of the north. Yet the emperor, with affected sorrow and piety,—stating, too, that he warred against the temporal not the spiritual pope,—went into mourning on account of this conquest; forbade the ringing of the bells; commanded processions to be made, and prayers to be offered up for the deliverance of the pope, his own prisoner! He also took Francis the First prisoner, at the battle of Pavia, and sold him his liberty on very hard terms; yet, when the people of Ghent subsequently revolted, and Charles asked permission to pass through the dominions of France, it was granted; and though the generous Francis thus had his enemy in his power, yet he received and attended him with pomp and magnificence.

Charles fought, during his reign, about sixty battles, in most of which he remained victor. Not content with his vast possessions, he is supposed, with some reason, to have aspired at universal empire. He was also a great traveller, and made fifty different journeys and voyages into Germany, Spain, Italy, Flanders, France, England, and Africa.

As age crept upon him, fortune did not seem to continue to favour his enterprises. So that, feeling moreover, unfitted by a tormenting sickness for continuing to hold the reigns of government with steadiness, or to guide them with address, this great, powerful, and ambitious ruler, apparently weary and dissatisfied with the littleness of his own greatness, assembled the several councils of the Grandees of Spain, and of the States; and before them, after a long and solemn speech, detailing the events of his life and the course of his own conduct, he resigned all his dominions to his brother Ferdinand and his son Philip; and retreated to the monastery of Saint Justus, near Placentia, in Estremadura.

In this retreat, Charles occupied himself with innocent amusements and religious exercises. Sometimes he cultivated the plants in his garden; and at other times he rode out on a little horse, the only one that he kept, attended by a single servant on foot. When his infirmities confined him to his apartment, and deprived him of corporeal exercises, he was accustomed to admit a few gentlemen who lived near the monastery to visit him, whom he entertained familiarly at his table; or he devoted a portion of his time to the study of mechanical principles, and the application of them to the construction of curious machines. Such was his taste for these works, that he engaged Turriano, an ingenious artist of the time, to reside in the monastery. They worked together in constructing models of useful machines, and experimenting on their respective powers; and it is stated that the ideas of the monarch often assisted or perfected the inventions of the artist. He was also pleased, at times, with slighter and more fantastic works of mechanism; in fashioning puppets, which by means of concealed springs, mimicked the actions of men, to the amazement of the ignorant monks, who, observing movements which they could not comprehend, either distrusted their own senses, or suspected Charles and Turriano of communication with invisible powers. Charles was particularly curious with regard to the construction of clocks and watches; and being unable, after repeated trials, to bring any two of them to go exactly alike, he reflected, it is said, with a mixture of surprise and regret, on his own folly in having once bestowed so much time and labour on the more vain attempt to bring mankind to a precise uniformity of sentiment concerning the profound and mysterious doctrines of religion.

Robertson, the admirable historian of the reign of this emperor, thus speaks of his more serious occupations:—

> But in what manner soever Charles disposed of the rest of his time, he constantly reserved a considerable portion of it for religious exercises. He regularly attended divine service in the chapel of the monastery every morning and evening; he took great pleasure in reading books of devotion, particularly the works of St. Augustine and St. Bernard; and conversed much with his confessor and the prior of the monastery on pious subjects. Thus did Charles pass the first year of his retreat, in a manner not unbecoming a man perfectly disengaged from the affairs of the present life, and standing on the confines of a future world; either in innocent amusements, which soothed his pains, and relieved a mind worn out with excessive application to business, or in devout occupations, which he deemed necessary in preparing for another state.
>
> But about six months before his death, the gout, after a longer intermission than usual, returned with a proportional increase of violence. His shattered constitution had not vigour enough remaining to withstand such a shock. It enfeebled his mind as much as his body, and from this period we hardly discern any traces of that sound and masculine understanding which distinguished Charles among his contemporaries. An illiberal and timid superstition depressed his spirit. He had no relish for amusements of any kind. He endeavoured to conform in his manner of living to all the rigour of monastic austerity. He desired no other society but that of monks, and was almost continually employed with them in chaunting the hymns of the missal. As an expiation for his sins, he gave himself the discipline in secret with such severity, that the whip of cords which he employed as the instrument of his punishment, was found after his decease tinged with his blood. Nor was he satisfied with these acts of mortification, which, however severe, were not unexampled. The timorous and distrustful solitude which always accompanies superstition, still continued to disquiet him, and, depreciating all the devout exercises in which he had hitherto been engaged, prompted him to aim at something extraordinary, at some new and singular act of piety, that would display his zeal, and merit the favour of heaven. The act on which he fixed was as wild and uncommon as any that superstition ever suggested to a weak and disordered fancy. He resolved to celebrate his own obsequies before his death. He ordered his tomb to be erected in the chapel of the monastery. His domestics marched thither in funeral procession, with black tapers in their hands. He himself followed in his shroud. He was laid in his coffin with much solemnity. The service for the dead was chaunted, and Charles joined in the prayers which were offered up for the rest of his soul, mingling his tears with those which his attendants shed, as if they had been celebrating a real funeral. The ceremony closed with sprinkling holy water on the coffin in the usual form; and all the assistants retiring, the doors of the chapel were shut. Then Charles rose out of the coffin, and withdrew to his apartment, full of those awful sentiments which such a singular solemnity was calculated to inspire. But either the fatiguing length of the ceremony, or the impression which the image of death left on his mind, affected him so much, that next day he was seized with a fever. His feeble frame could not long resist its violence, and he expired on the 21st of September, 1558, after a life of fifty-eight years, six months, and twenty-five days.

SOME ACCOUNT OF THE ASSASSINS OF ASIA.

II.

HAVING in a former article described the nature and constitution of the sect of Assassins, we now give a few examples of the mode in which the devotees executed their fearful commissions.

The sheikh sometimes deemed it more advisable to restrain his powerful enemies by impending danger, or to unnerve them by terror, than by actual assassination. One of the sultans of Persia having excited his enmity, he contrived to gain over a slave belonging to the sultan, or perhaps the slave was one of his own devotees in disguise. The slave, while the sultan was sleeping, stuck a dagger into the ground close to his head. The prince was terror-struck when, on awaking, he espied the murderous weapon; but he concealed his fear. The sheikh a few days afterwards sent him a letter, in which, to gain him over by mingled terror and confidence, he said, "Had we not been well-disposed towards the sultan, we might have plunged the dagger into his heart, instead of the ground."

On another occasion, a grand vizier was murdered by a devotee, who entered his service as a groom. One day, as the vizier went into the stable to inspect his horses, the false groom appeared before him without clothes, in order to avoid all suspicion of carrying concealed weapons; but he had hidden his dagger in the mane of the horse, whose bridle he was holding. The horse reared, and under pretence of quieting him with caresses, he snatched his poniard, and stabbed the vizier.

On one occasion, when the sheikh was offended with the sultan, he sent his devotees to set fire to Aleppo with burning naphtha. All the efforts of the governor and his people to extinguish the conflagration were fruitless, as it was produced by means similar to the celebrated Greek fire, and pertinaciously resisted the action of water. Many buildings were entirely consumed, and an immense quantity of rich stuffs and commodities of all kinds fell a prey to the flames. The Assassins threw burning naphtha into the streets, from the terraces of the houses, and, in the midst of the confusion, escaped the popular rage unhurt.

The degree of ascendancy which the sheikh acquired over his adherents or subjects, was extraordinary. On one occasion the sultan Melekshah sent an ambassador to the sheikh to demand his fealty and obedience. The sheikh, in presence of the ambassador, called several of his people into the room. Beckoning to one of them, he said, "Kill thyself!" and the man instantly stabbed himself; to another, "Throw thyself down from the rampart!"—the next instant he lay a mutilated corpse in the moat. On this, the sheikh turned to the ambassador, who was unnerved by terror, and said, "In this way I am obeyed by seventy thousand faithful subjects. Be that my answer to thy master."

Some years after this, Count Henry of Champagne, passing near the territory of the Assassins in his way to Armenia, the sheikh sent deputies to welcome him, and to invite him to visit his fortress on his return. The count accepted the invitation, and came; the sheikh hastened to meet him, and received him with great honours. He took him to several castles and fortresses, and brought him at last to one having very lofty turrets. On each look-out stood two guards, dressed in white, which was a symbol of their being initiated in the secret doctrines. The sheikh told the count that these men obeyed him better than the christians did their princes; and, giving a signal, two of them instantly threw themselves from the top of the tower, and were dashed to pieces at its foot. "If you desire it," said the sheikh to the astonished count, "all my whites shall throw themselves down from the battlements in the same way." The latter declined, and confessed that he could not calculate upon such obedience in his servants.

The extent to which the Assassins insinuated themselves into the highest quarter was extraordinary. On one occasion an envoy was sent from the sheikh to the sultan, for the adjustment of some difficulties between them. When it was terminated, the envoy was entertained at the house of the grand vizier. At a grand banquet, the wine having already mounted to their heads, the envoy said to his host, that, in the immediate retinue of the sultan, among his guards, marshals, and pages, were several assassins. The vizier, curious to become acquainted with these dangerous unknown, entreated the ambassador to produce them, and gave him his handkerchief as a pledge that no harm should befall him. Immediately five of the most confidential of his chamberlains stepped forward as disguised Assassins. "On such a day, at such an hour," said one of them, an Indian, to the vizier, "I could have murdered thee with impunity, and unobserved; and if I did not, it was merely from the want of my superior's commands." The vizier, half intoxicated, and overcome with affright, threw himself at the feet of the Assassins and begged them to spare his life. When the sultan came to hear of this occurrence, he ordered the five men to be buried alive, a death which they bore cheerfully, as they deemed that they suffered it for the sake of their master.

The women shared with the men the sentiment of glory which they imagined attached to the rank of an Assassin. On one occasion the prince of Mossul was attacked by eight Assassins, disguised as dervishes, as he was in the act of seating himself on his throne in the mosque at Mossul. Protected by a coat of mail and his natural bravery, he defended himself against the wretches, three of whom he stretched at his feet; but before his retinue could hasten to his assistance, he received a mortal wound, from the effects of which he expired the same day. The remaining Assassins were sacrificed to the vengeance of the populace, with the exception of one young man from the village of Katarnash, whose mother, on hearing of the prince's murder, dressed and adorned herself for joy, at the successful issue of the attempt, in which her son had devoted his life; but on seeing him return alive, and alone, she cut off her hair, and blackened her face, with the deepest sorrow, that he had not shared the *honourable* death of the murderers, as these poor mistaken persons deemed it to be.

Such, then, were the Assassins, and such the mode in which they put their diabolical plans in execution. We must now say a few words as to their subsequent history.

We have frequently had to use the word *sheikh*. But this does not always imply the same person. After Hassan Sabah's death, he was succeeded in the supreme authority by others, for several generations. They gradually extended their conquests and power into Syria, and other places to the west of Alamut. It appears probable that what little was known to Europeans of the existence of the Assassins was derived more from the Syrian branch than from the original stock which occupied Alamut.

We have said that it was in the year 1090 that Hassan planted his standard at Alamut. In the [illegible]

lowing century Syria and the contiguous parts became the scene of the warlike proceedings of the Crusaders; Syria was, indeed, at that time, in an extraordinary position. The Mohammedans had possession of the Holy Land:—the Assassins, whose character was a combination of Mohammedan and atheist, were spreading terror by means of the poniard, through the Mohammedan courts: and the Crusaders, hating and opposing both the others, lost no opportunity of assailing and routing them. There were thus three parties fighting against one another; and it ought not to surprise us, if shameful and disgraceful coalitions were at times entered into between two of the parties against the third. It has been proved that some of the leaders of the Crusades at times joined the Assassins against the Mohammedans, or Saracens, as they were more commonly termed.

Alamut did not continue uninterruptedly in the possession of the Assassins. It was at one time taken, then re-conquered, then taken again. Nor did the sheikhs remain uniform in their proceedings. One of them broke through the rule which Hassan laid down, and communicated the secret and atheistical doctrines of the order to the lower members of the society as well as the upper.

We have no wish, even if we had space, to follow out minutely the sanguinary and demoralizing proceedings of this ruthless band. Suffice it to say, that a day of retribution, so far as human retribution can go, was at hand. Most of our readers are familiar with the name of Jengis, or Genghis Khan, a Tartar, who, with countless hordes of barbarians, overran the fairest countries in Asia, overturning thrones, carrying off immense booty, massacreing thousands upon thousands of Chinese, Indians, Persians, and other Asiatic nations. Genghis overturned many thrones, but left the Assassins in possession of their ill-gotten power. This was not to last, however. In the year 1263, Manchou Khan, the third in succession to Genghis Khan, swept through Persia like a whirlwind, with a horde of Mouguls, and rooted up the power of the Assassins. Alamut was taken, most of the inmates put to the sword, and the rest dispersed over various countries. The Assassins did not become extinct by this event; for they more or less influenced the politics of courts for some time afterwards. But as a fraternity, as a united band of resolute men, devoted to the performance of any act, however atrocious, commanded by their leader, they may be said to have ceased to exist at the period we mention.

Thus, then, about one hundred and sixty years after Hassan took possession of the mountain-fortress of Alamut, the Mouguls took it from his successors, and the Assassins became a wandering race, and ultimately were extinguished altogether.

To speak well, it is requisite to have a great deal of wit, and an excellent judgment. Some who do not talk much, listen with so much ingenuous attention, that it is plain they understand what wit is, and have a good deal themselves. —LADY GETHIN.

MORAL energy, or constancy of purpose, seems to be less properly an independent power of the mind than a mode of action by which its various powers operate with effect; but, however this may be, it enters more largely, perhaps, than mere talent as commonly understood, into the formation of what is called character. In the ordinary concerns of life, indeed, it is more serviceable than brilliant parts; while, in the more important, these latter are of little weight without it, evaporating only in brief and barren flashes, which may dazzle the eye by their splendour, but pass away and are *forgotten*.—PRESCOTT.

POISONS. I.

A NUMEROUS class of substances, whose action upon the living body is accompanied by the serious disturbance, the partial suspension, or the total destruction of its vital functions, are denominated POISONS. The branch of science which treats of the properties of these substances, of the means of detecting them when administered by mistake, or with a criminal intent, and of mitigating, or entirely counteracting their baneful effects, is called *Toxicology*, a term derived from two Greek words, signifying a discourse upon poisons.

Until within the last two years, the specific action of some of the most common and most virulent poisons was only very imperfectly, if at all, understood. Hence there is but too much reason to believe that many innocent persons have suffered death under the sanction of judicial proceedings; the evidence adduced, and which we rejoice to say would now be considered inadmissible, being too often the result of vulgar prejudices, of popular superstitions, or of professional ignorance.

The science of toxicology implies that its professor should not only possess an intimate acquaintance with the chemical constitution of bodies generally, and of poisonous substances in particular, with the symptoms by which the judgment may be directed in tracing the causes of any sudden attack of dangerous illness, with the means of determining the precise character of the poison from the effects of which the patient may be suffering, and that he should be able to make a judicious selection of the most efficient remedies; but it is further necessary that he be competent to investigate all the circumstances connected with the case, patiently and fearlessly; collecting evidence from sources which by common observers are entirely overlooked, so that by the combination of physical with moral proofs, he may become instrumental in allaying unfounded suspicions, in vindicating the innocent from unjust accusations, and in furthering the designs of justice, by causing the conviction and well-deserved punishment of the guilty.

In cases of criminal poisoning the skill of the toxicologist is almost always severely tested. If the death of the victim have not actually taken place, it frequently happens that recovery is hopeless; and then other difficulties, more formidable than any which the alarm, the grief, and the confusion such calamities occasion, beset the path of the inquirer. These originate, when death has occurred, in the delay which the rules of decency and the forms of law require; in the secrecy with which deeds of darkness are usually planned, and the caution with which they are executed, and this is equally applicable to cases of suicide as of murder; and in the disinclination which very generally prevails to make disclosures affecting the character either of the dead or of the living.

The want of sufficient calmness in deciding, and of promptitude in acting, on the part of those who happen to be the first witnesses of sudden illness, is not unfrequently the cause of protracted suffering, or of premature death. With most persons, the first impulse on such occasions is to fetch, or dispatch a messenger for a medical man. This is quite right, as far as it goes; but where circumstances of a suspicious, or, to use a less offensive term, a mysterious character, present themselves, it is necessary that particular directions, (they may be brief, yet at the same time very positive) should be sent to the professional attendant. Among the various incidents which ought very properly to attract attention and excite apprehension, we may mention the fastening of doors, or adopting other means to insure privacy; when the attack occurs im-

mediately after taking medicine, occasional refreshment, or a regular meal; when the individual has been unusually excited, as by grief, anger, disappointment, or jealousy, or when suffering under extraordinary depression—the result of mental emotions or of bodily ailments.

It is exceedingly difficult even for the physician to determine with anything like certainty what is the cause of sudden illness from symptoms only, and without calling to his aid the proofs to be derived from collateral circumstances—an additional reason why those who are in immediate attendance upon the patient should exercise their judgment, instead of giving way to their feelings. In cases of this kind, what at other times would be deemed too trivial to deserve notice, may be of the utmost importance; the issues of life, so far as human agency can be available, depending on such apparent trifles.

Nor are the foregoing precautions the less necessary in the absence of all presumptive proof, and when the evidence is conclusive to the contrary, that poison has been taken or administered with a guilty intention. Instances are unfortunately by no means rare in which the most distressing accidents are occasioned through negligence or ignorance on the part of the venders or the purchasers of medicinal and chemical preparations. In many cases these accidents originate in the substitution of one substance for another, to which externally it may bear some resemblance; in others by the incautious use of some such substance for a purpose different from that for which it is intended; or it may be that the mischief is done by an over dose of a valuable medicine, but which in too great a quantity operates as a poison; and this is sometimes the fault of the druggist or apothecary, and sometimes of the patient or attendant.

In the absence of all other proof than that which may be furnished by the symptoms, extreme caution is necessary in offering an opinion as to the cause of sudden illness or death; many of the symptoms accompanying the first attack, as well as those developed during the entire progress, of some forms of acute disease, so closely resembling cases of poisoning, that it is impossible without subsequent examination to distinguish the one from the other. Whatever, therefore, be the cause, whatever the character of the proofs, we think sufficient has been said to show how necessary it is that every fact, whether incidentally or otherwise, bearing upon the case, should be noted, and, when the proper time arrives, faithfully narrated. By pursuing such a course, much valuable time will be saved; many anxious and perhaps unpleasant enquiries be prevented; the medical adviser will begin his work with greater confidence and a better prospect of success; and be the result, as respects the patient, what it may, the feelings of friends will be less painfully excited when the real facts are known than when everything is involved in doubt and uncertainty.

To enter into all the details connected with toxicology would occupy considerable space,—a great deal more than we can afford to any single subject: nor would some of those details be altogether suitable for a publication like this, which is intended for general circulation. There are, however, many particulars relating to poisons, and to the accidental and criminal use of them, which cannot be too well known to all classes of readers. We therefore intend to devote a few pages, as we have opportunity, to an account of those substances which may, in the literal acceptation of the term, be considered poisonous, of those which produce disease or death by their improper or excessive use, and of others which have no specific action as poisons, but are still fatal in their effects, by the destruction of the parts on which the functions of life depend.

In addition to the appearances, the general properties and uses, and the other characteristics of the various substances just referred to, we shall endeavour to give some account of their effects upon the human body, and whether those effects are equally to be dreaded from the agency of absorption, when the substances are applied externally, as when they are taken into the stomach.

The antidotes to poisons must also receive particular notice, and especially those which are the most simple and safe in their application, and most likely to be attainable in any sudden emergency.

We must not omit to say something about the symptoms of poisoning; and, notwithstanding the difficulties to which we have already alluded, we shall try to distinguish those cases in which the symptoms are uniformly alike, from those in which they are variable, and therefore very uncertain in their indications.

The treatment proper to be adopted and the preparations which should be made, whilst waiting the arrival of the professional adviser, and on which the recovery of the patient may, perhaps, mainly depend, will be distinctly marked out; the reasons being assigned for what, in particular cases, would otherwise be deemed contradictory statements.

The use of tests and other appropriate means for the detection of poisonous or deletereous substances, in some instances before, but more frequently after, the death of the sufferer, constitutes so important a branch of the subject, that our observations would be incomplete without some reference to the manner in which such investigations are usually conducted. This part of the inquiry necessarily implies a knowledge of chemical decomposition and analysis, as it does also of those changes and appearances of certain parts of the body, which are induced by disease or which result from the contact of medicines when properly administered, and of medicinal or poisonous preparations when improperly administered. Here we think it will be obvious we must be content with one or two cases as examples; which, by way of caution and of warning, may show what can with equal facility be done in other cases.

Intimately associated with the evidence derived from chemical analysis and post-mortem examinations, are the moral evidences of suspected guilt. Here, as we have before hinted, some apparently trifling incident will almost always furnish a clue to the whole transaction, and without which every other kind of evidence would have been unsatisfactory, and as respects the real offender, inconclusive.

Thus have we very briefly, yet, as we trust, intelligibly, disclosed the most prominent features of the plan we mean to pursue. We are anxious to place these several matters before our readers in such a way as to merit their approval. How far we may succeed in doing so the future must determine.

How many there are that take pleasure in toil; that can outrise the sun, outwatch the moon, and outrun the fields' wild beasts! merely out of fancy and delectation, they can find out mirth in vociferation, music in the barking of dogs, and be content to be led about the earth, over hedges and through sloughs, by the windings and the shifts of poor affrighted vermin: yet, after all, come off, as Messalina from her wantonness, tired, and not satisfied with all that the brutes can do. But were a man enjoined to this, that did not like it, how tedious and how punishable to him would it prove! since, in itself, it differs not from riding post.—Feltham.

THE EVENING OF LIFE.

AMID life's varied streams and sources of transport and pain, often mingled and often alternating, we learn at last to prefer those milder and more certain or enduring pleasures which calmly soothe us, to the bustle, the labour, and the excitements that engage and animate our youth, and maturer strength. Agitation and emotion at length lose their charm: they disturb more than they amuse us. As age advances to its sober evening, we perceive and appreciate the value of conscious life without pain; of sedate tranquillity; of reposing, yet not inactive, thought; of sensibility without perturbation; of patient hope; of resting moveability; of sensations that please, but do not agitate; of intellectual rumination; and of those solemn aspirations of sacred foresight, of prospective gratitude, and of humble reliance on the great mediatorial Benefactor, which close our mortal days with true dignity, and make even dissolution an inestimable blessing.—SHARON TURNER.

No passion can lead to such extremities, nor involve a man in such a complicated train of crimes and vices, and ruin whole families so completely, as the baneful rage for gambling. It produces and nourishes all imaginable disgraceful sensations; it is the most fertile nursery of covetousness, envy, rage, malice, dissimulation, falsehood, and foolish reliance on blind fortune; it frequently leads to fraud, quarrels, murder, forgery, meanness, and despair; and robs us in the most unpardonable manner of the greatest and most irrecoverable treasure—*time*. Those that are rich act foolishly in venturing their money in uncertain speculations; and those that have not much to risk must play with timidity, and cannot long continue play unless the fortune of the game turn, as being obliged to quit the field at the first heavy blow; or if they stake everything to force the blind goddess to smile upon them at last, madly hazard their being reduced to instant beggary. The gambler but rarely dies a rich man; those that have had the good fortune to realise some property in this miserable way, and continue playing, are guilty of a two-fold folly. Trust no person of that description, of whatever rank or character he may be —BARON KNIGG.

A MAN of pleasure is one who, desirous of being more happy than any man *can* be, is less happy than most men *are*. One who seeks happiness everywhere but where it is to be found. One who out-toils the labourer, not only without his wages, but paying dearly for it.—YOUNG.

IT is singular that minor motives should often produce a powerful effect, which is looked for in vain from the highest and the best. Let those who speculate on human nature, and its endless inconsistencies, solve the enigma. A conviction of duty, of responsibility,—the delight of increasing the happiness of others, the policy of guarding our own, how often are they all insufficient to restrain the ebullitions, or to regulate the infirmities of temper; but strange to tell, the elephant, who could trample down an armed host, permits himself to be led by a little child—the faults over which a sense of duty to God have no power, yield to a sense of decorum.

There are persons, indeed, who, on the subject of temper, plead a sort of prescriptive right to indulgence, on the ground of constitutional infirmity or hereditary entailment, but before such pleas can be considered valid in the court of conscience, let them say whether there are no circumstances sufficiently powerful, whether there is no presence sufficiently august, to awe them into self-control—whether, in certain moments of their lives, they have not found the most indignant feelings controllable, the fiercest blaze of passion repressible.

If this be the case, and experience attests the fact, the plea of necessity falls to the ground; and can they forget, that in every moment of their lives they are in a presence the most august, under the vigilant observation of that mighty Being, compared to whose glance the gaze of an assembled world is powerless and insignificant?

This is the avowed theory of numbers, who scruple not to darken and trouble the stream of life by capricious waywardness, or unrestrained irritability,—who shed, without remorse, the bitterest drops into the crystal cup of domestic *happiness*.—*Private Life*.

SEAT OF WAR IN THE EAST.

No. II.

BELOOCHISTAN, SINDE, AND PUNJAB.

OUR southward course has now brought us to BELOOCHISTAN, which, though nominally belonging to Afghanistan, is, in fact, entirely independent of the kingdom of Cabùl. It extends along the Indian ocean, from the Indus nearly to the entrance of the Persian gulph; while the desert of Seistan forms its opposite or northern boundary. It is confined by a part of the Persian territory on the west, and by the Sinde on the east. Beloochistan is as large as Great Britain and one half more, extending over a surface of 180,000 square miles.

Eastern Beloochistan consists of huge masses of rugged and rocky mountains, between which occasionally intervene vallies that are mostly arid and stony. The streams which roll through this district have a singular and, to travellers, a fatal peculiarity. When swollen by rain they rush through their beds with such headlong rapidity as soon to leave them dry, and thus serve as roads or nightly resting places; but the water sometimes comes back upon those who have sought the shelter, with such unexpected force as to overwhelm every object in its course. Such an accident Arrian reports the army of Alexander to have suffered.

The capital, *Kelat*, is a town of about 4000 houses and 20,000 inhabitants, and is supposed to stand on ground 8000 feet above the level of the sea. Hence in winter it is subject to such intense cold, that the Khan and principal chiefs descend to the lower parts of the country. *Nooshky*, *Saracran*, *Thalawan*, and *Kharan*, are little mud towns, capitals of the districts, bordering on the desert. *Punjgoor* is surrounded by a fertile territory, watered by the river *Baldoo*. The best land is that situated in the north-eastern portion of Beloochistan, which is embraced in the province of Caht-Mundave.

Between the Indian ocean and the mountains of Kelat is the district of *Mekràn*, over which the Khan of Beloochistan has no controul, it being tributary to the Iman of Muscat. Arid valleys, traversed by numerous beds of mountain torrents, but occasionally presenting verdant spots, and rugged, though not elevated mountains, are the chief characteristics of this province, the whole of which at one time formed a portion of the Persian empire.

The stupendous chain of the Himalaya separates the Afghanistan and Beloochistan countries from the Sinde and Punjab territories; and although the river Indus is the natural boundary of the Hindùstanee empire, yet the latter kingdoms, through which it runs to its estuaries in the Indian sea, are usually included as forming part of Hindùstan.

The kingdom of SINDE consists of a Delta *, formed by the several branches of the Indus, by which it empties itself into the sea; together with a large portion of territory on each side of the banks of the streams. The alluvial and inundated parts of the kingdom are kept in a high state of cultivation, and yield considerable crops of rice, sugar, indigo, and cotton. The sea coast of the Indian Delta, in consequence of frequent inundations of salt water, presents a desert of flat and marshy sand.

Corachie, which is situated somewhat westward of the river, is the only sea-port of Sinde, and from that circumstance still retains some commercial import-

* A name given to all those alluvial tracts at the mouths of great rivers which empty themselves into the sea by two or more diverging branches. The appellation was originally given to Lower Egypt, by the Greeks, which, like other such lands is, in form, something like the fourth letter in the Greek alphabet, Δ Delta.

ance. It contains a population of eight thousand persons, among whom the Hindoos are the most active and industrious.

Tatta, the ancient Pattala, situated on the eastern branch of the river, was anciently one of the greatest of Oriental emporia; enjoying a free navigation up the Indus as far as Lahore, it became the grand medium by which the products of Western India and Afghanistan were exchanged for those of Malabar and Coromandel, and for European goods.

The breaking up of the Mogul empire, of which the Sinde once formed a part, almost destroyed the commercial importance of Tatta. Two-thirds of the original area of the town are now in ruins, and although formerly no fewer than forty thousand weavers alone found employment within its walls, its whole population at the present time amounts to no more than twenty thousand souls. The streets are narrow and dirty, and the houses are mere cottages built of mud and bamboo. There is an old English factory still remaining in Tatta, which is the best structure in the place. About a mile distant from the town, on a mountain, is an amazing number of splendid tombs, but the mosques and pagodas are fast going to ruin.

One great cause of the decay of Tatta was the transference of the seat of government to *Hyderabad*, which is situated higher up on the opposite side of the Indus, and about two miles eastward of it. A branch of the river, called *Fulalee*, winds round the city and forms it into an island. The town is not so large as Tatta, and though its rival, scarcely equals it in importance. Leather and arms are the only manufactures of Hyderabad.

Before forming the Indian Delta, and after uniting the five streams of Punjab, the Indus flows in an undivided stream through the upper parts of Sinde. The regions beyond the immediate banks of the waters are almost entirely desert.

PUNJAB, (which in the native language means the Country of the Five Rivers,) commences with the province of *Moultàn*, where two great channels of the river roll through a desert, which, however, has some fertile spots rendered productive, partly by a limited inundation, and partly by the conveyance of water by means of Persian water-wheels over fields, thus made productive even at a considerable distance from the river. The city of Moultàn is about four miles in circumference, and is surrounded by a handsome wall. It contains a temple of great antiquity, highly venerated, and the object of crowded pilgrimages from all parts of India. An inferior kind of Persian silks and carpets are manufactured at Moultàn. The western part of the Moultàn province comprises the district of *Lèra*, which is bounded by the snow-capped mountains of Afghanistan. Near the river, a superior order of agricultural economy is observable, and the soil is not unproductive, but more remote from its banks, the territory is little better than a desert.

But the most extensive province is that of Lahore, which, indeed, includes a great portion of the whole kingdom. The city of Lahore was, under the Moguls, one of the most celebrated and magnificent places of the East, but the multiplied desolations which the city has suffered, have shorn it of its early splendour. A palace adorned in the highest style of Eastern gorgeousness, is still sufficiently undisturbed by time and warfare, to attest the former magnificence of Lahore. Its terraced roof, covered with a parterre of the choicest flowers, not inaptly represents the "Hanging Gardens" of Babylon. There is also a mausoleum which attracts the admiration of every traveller.

The situation of Lahore must, however, always secure for it some degree of importance. A fine river, the *Ravee*, tributary to the Indus, flowing beside its walls, and the principal road from India to Persia running through it, the city can never sink into insignificance. It is besides the capital of Punjab.

The holy city of *Amritser* is celebrated for a large tank called the "Pool of Immortality," after bathing in which, the faithful of the sect of Seiks believe themselves to be purified from all past sins; it need scarcely be added that immense numbers take this method of easing their consciences. In this town is an arsenal, in which the king, Runjeet Singh*, keeps his treasures.

Between Lahore and the district of Ladack, are two other principal towns, Attock and Cashmere. The whole of Punjab is bounded by Little Tibet.

* See *Saturday Magazine*, Vol. XII., pp. 239, 247.

THE GAUCHOS OF SOUTH AMERICA.

ONE of the most remarkable nations, if such they may be called, in America, are the *Gauchos* of South America. They have, to some extent, the character of Christians, since the Portuguese Jesuits established missionaries among them, but they are, in their general habits, as wild, simple, and rude a people as can well be imagined. To comprehend the tract of country which they inhabit, it will be necessary to observe, that a vast chain of mountains (the Andes) traverses the whole extent of South America, from one end to the other. This chain is much nearer to the western, or Pacific shore of America, than to the eastern, or Atlantic shore, and the short space between the chain and the Pacific is intersected by ravines whose vastness and depth is not equalled in any other part of the world. But the eastern side of the Andes presents a very different appearance; since it consists of a vast plain, in some places a thousand miles broad. To this plain the name of *Pampas* has been given; and the Gauchos are a people inhabiting this Pampas, whose habits of life very much resemble those of the Arabs.

In almost every part of the Pampas wild cattle and horses roam about, in all their native liberty; and one of the chief employments of the Gauchos is to capture them, and either tame them for sale, or kill them for some other advantageous result. The mode of catching these animals is so extraordinary, that were it not related by writers of established reputation, it would scarcely be credited. It forms a striking instance of what may be effected by practice.

The Gaucho from very infancy is preparing himself for his after life. Captain Hall saw little fellows, just able to run about, *lassoing*, or capturing cats, and entangling the legs of every dog that was unfortunate enough to pass within reach. In due season they become very expert in their attacks on poultry, and afterwards in catching wild birds. By the time they are four years old they are on horseback, and immediately become useful in driving home the cattle; and by degrees they acquire that dexterity in catching wild animals which is so remarkable.

The mode of capture is by throwing a *lasso*† over some part of the animal. A lasso (from the Spanish *laso*, a slip-knot) consists of a rope made of twisted strips of untanned hide, from fifteen to twenty yards long, and about as thick as the little finger.

If it is proposed to capture a wild bull, two mounted Gauchos ride at full gallop, each swinging the lasso round his head. The first who comes within reach aims at the bull's horns; and when he sees that the

† See *Saturday Magazine*, Vol. VIII., p. 39.

lasso will take effect, he stops his horse, and turns it half round, the bull continuing his course till the whole cord has run out. The horse, meanwhile, knowing by experience what will happen, leans over as much as he can in the opposite direction from the bull, and stands prepared for the violent pull which the bull will shortly give him. Sometimes the check is so abrupt and violent, that the bull is not only dashed to the ground, but rolls along at the full stretch of the lasso while the horse is drawn sideways, and ploughs up the earth with his feet for several yards.

In capturing a horse instead of a bull, the lasso is thrown round the two hind legs, and as the Gaucho rides a little on one side, the jerk pulls the entangled feet laterally, so as to throw him on his side, without endangering his knees or face. Before the horse can recover the shock, the rider dismounts, and taking his cloak from his shoulders, wraps it round the prostrate animal's head. He then forces a powerful bit into the horse's mouth, straps a saddle on his back, and, bestriding him, removes the cloak from his head; upon which the horse springs on his legs, and endeavours, but in vain, to disencumber himself of his new master, who sits quite composedly on his back.

Sir Francis Head witnessed the mode of taming young horses, which is somewhat similar to the mode of catching them. A lasso was thrown over the neck of a young horse, about three years old. His first idea was to gallop away; but the jerk of the lasso effectually prevented him. Some men then ran up to him on foot, and threw a lasso over his four legs, just above the fetlocks, and twitching it, they pulled his legs from under him by a sudden jerk, and threw him on the ground. In an instant a Gaucho was seated on the horse's head, and with his long knife, in a few seconds he cut off the whole of the horse's mane, while another cut the hair from the end of his tail. They then put a piece of hide into his mouth, to serve as a bit, and a strong hide-halter on his head. The Gaucho who was to mount, arranged his spurs, which were unusually long and sharp; and while two men held the animal by the ears, he put on the saddle, which he girthed extremely tight. He then caught hold of the horse's ear, and, in an instant, vaulted into the saddle; upon which, the man who was holding the horse by the halter threw the end of it to the rider. The horse instantly began to jump, but the Gaucho's spurs soon sent him on, and off he galloped, doing everything in his power to throw his rider.

Captain Basil Hall, in reference to the dexterity of the Gauchos, observes :—

> The unerring precision with which the lasso is thrown is perfectly astonishing, and to one who sees it for the first time, has a very magical appearance. Even when standing still, it is by no means easy to throw the lasso; but the difficulty is vastly increased when it comes to be thrown from horseback and at a gallop, and when, in addition, the rider is obliged to pass over uneven ground, and to leap hedges and ditches in his course. Yet such is the dexterity of the countrymen, that they are not only sure of catching the animal they are in chase of, but can fix, or, as they term it, *place* their lasso on any particular part they please, either over the horns or neck, or round the body; or they can include all four legs, or two, or any one of the four; and the whole with such ease and certainty, that it is necessary to witness the feat, to have a just conception of the skill displayed. It is like the dexterity of the savage Indian in the use of his bow and arrow, and can only be gained by the arduous practice of many years: it is, in fact, the earliest amusement as well as business of these people.

The same entertaining writer informs us, that during the war of independence in Chili, the lasso was used as a weapon of great power in the hands of these people, who made bold and useful troops, and never failed to dismount cavalry, or to throw down the horses of those who came within their reach. There is a well-authenticated story of a party of eight or ten of them, who had never seen a piece of artillery, till one was fired at them in the streets of Buenos Ayres. Notwithstanding the effect of the fire, they galloped fearlessly up to it, threw their lassos over the cannon, and by their united strength fairly overturned it.

It is also related, that a number of armed boats were sent to effect a landing at a certain part of the coast guarded only by Gauchos. The party in the boats, caring little for an enemy unprovided with fire-arms, rowed confidently along the shore. The Gauchos, meanwhile, were watching their opportunity, and the moment the boats came sufficiently near, dashed into the water, and throwing their lassos round the necks of the officers, fairly dragged every one of them out of their boats.

THE SOUTH-AMERICAN LASSO.

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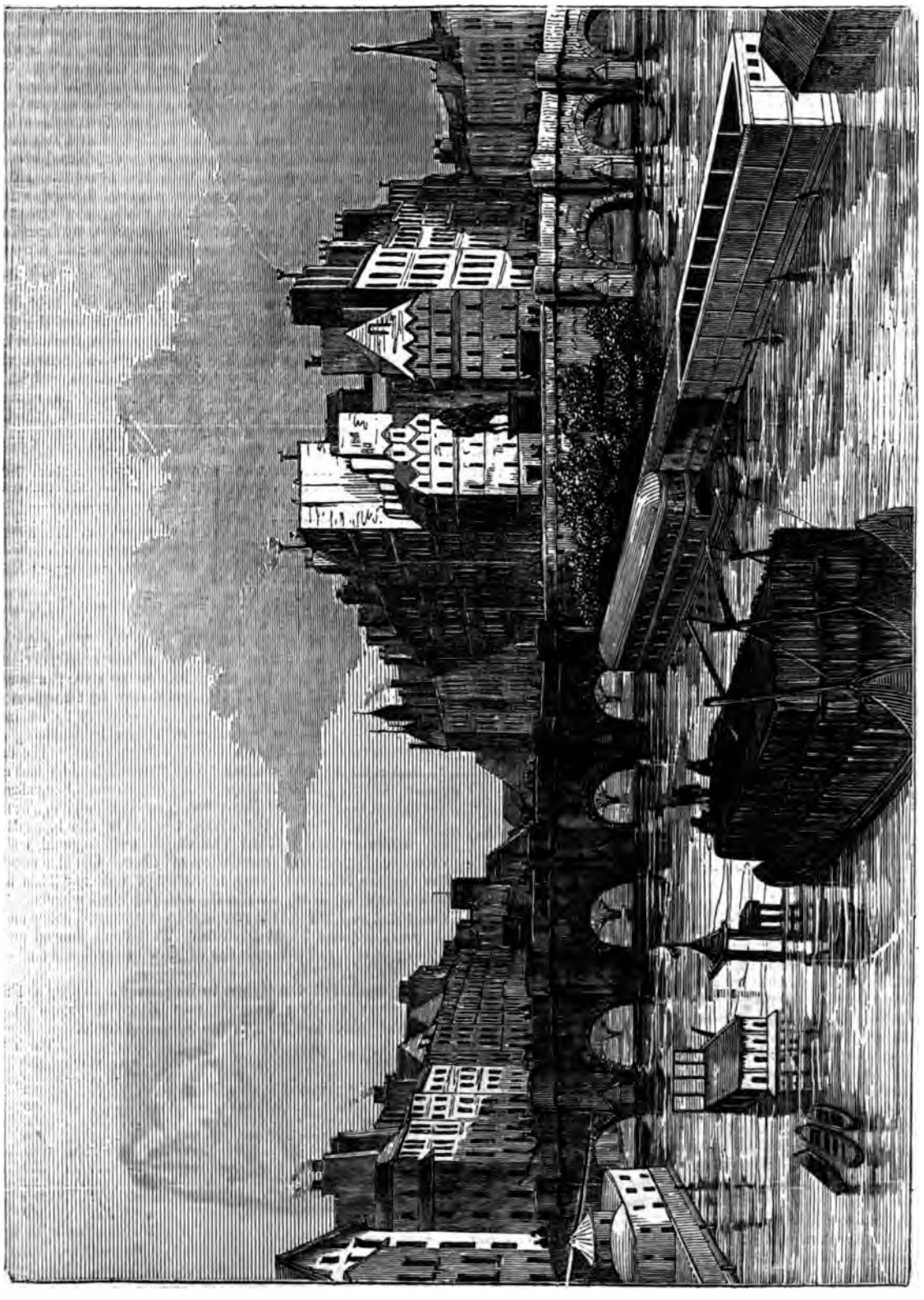


VIEW OF THE PONT-NEUF, AND THE WESTERN END OF THE *ISLAND OF THE CITY*, AT PARIS.

SOME ACCOUNT OF PARIS, HISTORICAL AND DESCRIPTIVE.

PART THE FIRST

THERE is no city in the world which possesses stronger claims to our attention than Paris, the capital of the French monarchy. Some cities indeed surpass it, as they likewise surpass all others, in particular sources of interest:—as, for instance, Rome and Athens, in local sanctity and classical associations;—Constantinople, in beauty of scenery and picturesque effect;—and London in the vastness of its size and commerce. But not one of these cities, nor, indeed, any other, has figured so conspicuously on the scene of modern history as Paris; which may boast of having been the theatre of events, unparalleled in the annals of the world. Moreover, in all the ordinary attractions of a great capital, as in works of architecture, sculpture, painting, &c., Paris is not deficient; while, in regard to some of them, such as collections of natural history, &c., it is undoubtedly pre-eminent.

It is our intention to devote a series of supplements to an account of this great city; not confining ourselves to a description of it as it exists at the present day, but illustrating its former condition, at various periods, and narrating the more prominent occurrences in its eventful history.

Before, however, entering into the history of Paris, it will be desirable for us to offer some remarks upon its situation and physical characteristics,—"to describe the locality of the scene, before introducing the things and persons about to figure in it." The latitude of the observatory of Paris is 48° 50′ 14″; but that building is near the southern limit of the city, the centre of which lies about a mile and a half further to the north. The longitude of the observatory is, in French language, *zero*, the meridian of that building being itself the starting point of French geographers; according to our system, in which the starting point is Greenwich, the longitude of Paris is said to be 2° 20′ 24″ E., just as, in the French system, the longitude of Greenwich is said to be 2° 20′ 24″ W. Comparing Paris with London, in respect of latitude, we find that the observatory in the former lies 2° 40′ 33″ (or about 121 miles) further south than the cathedral of St. Paul's in the latter.

The following are the direct distances of some of the French towns and the principal cities of Europe from Paris, in English miles:

Amiens	75	Calais	146	Nantes	201
Bayonne	408	Dieppe	92	Orléans	65
Bordeaux	306	Havre	108	Rouen	68
Boulogne	131	Lyons	240	Strasburg	242
Brest	318	Marseilles	460	Toulouse	365
Amsterdam	260	Dresden	527	Rome	685
Antwerp	188	The Hague	233	Stockholm	960
Berlin	546	Lisbon	902	St. Petersburg	1345
Brussels	154	London	214	Turin	345
Constantinople	1397	Madrid	652	Venice	525
Copenhagen	639	Milan	397	Vienna	643
Dantzic	794	Naples	802	Warsaw	851

THE RIVER SEINE, &c.

PARIS is watered by two streams, one of which alone, the Seine, is worthy of being considered a river; the other, called the Bièvre, being an insignificant rivulet. The Seine has its source in the forest of Chanceaux, two leagues from Saint Seine, in the department of the Côte-d-Or. Before reaching Paris, it receives the tributary waters of the Yonne, the Yerre, and the Marne; below that city it receives the Oise and the Eure, and enters the sea between the towns of Havre and Honfleur, after a very winding course. In its passage through Paris, it flows from south-east to north-west, for the most part in a straight course; but just before leaving the city it makes a considerable bend to the south-west. The length of its course within the walls,—that is to say, from the barrier of *la Rapée* on the east to that of *Passy* on the west, is 8940 yards.

The Seine divides Paris, as the Thames divides London, into two unequal parts; but the difference between the northern and southern portions of Paris is by no means so great, either in point of size or importance, as between the correspondent portions of our own metropolis. Moreover, *in its passage through* the city, the river forms three islands in close succession,—the *Ile Louviers*, the *Ile Saint Louis*, and the *Ile de la Cité*. Of these, the first is about 600 yards in length; it is uninhabited, being used only for depôts of fire-wood. The Ile Saint Louis, which has been built upon since the reign of Louis XIII., is about 750 yards long. The westernmost island, or that "of the city," is the oldest part of Paris, and may be termed its cradle; its length is about 1350 yards. Formerly it was not so great; it became what it is in the reign of Henry the Fourth, when two small islands, which had lain apart from it, since the earliest ages of Paris, were united, and added to its western extremity.

Unlike the Thames at London, the Seine at Paris is not influenced by the tide; consequently the depth and breadth of its waters vary continually with the seasons. In the summer its bed is in many places exposed to view, and in some it is even fordable; during the winter the stream is greatly augmented, and its current often becomes impetuous. Its velocity at ordinary times is about a mile and a quarter an hour, between the Pont Neuf, and the Pont Royal.

The height of the waters of the Seine is measured according to scales which are placed at three of the bridges,—the Pont de la Tournelle, the Pont Royal, and the Pont Louis XVI.,—and is reckoned from the low-water mark of the year 1719. The practice of noting with precision the variations in the height of the river, was commenced in the reign of Louis XIV; the following table exhibits some of the most remarkable. The measures are French mètres*; and they are counted from the zero point of the scale, at the Pont de la Tournelle.

1645, July 11	9·04	1764, Nov. 15	7·00
1649, Jan.	7·65	1784, March 4	6·66
1651, Jan.	7·80	1799, Feb. 4	6·97
1658, March 1	8·80	1802, Jan. 3	7·32
1690, March	7·50	1807, March 3	6·70
1711, March	7·55	1817, March	6·30
1740, Dec. 25	7·90	1836, May 8	6·40
1751, Jan.	6·70		

These risings of the Seine have often been the cause of serious damage. We occasionally read, in the history of Paris, of their carrying away its bridges. Their ravages were more especially destructive before the construction of the quays, which now line the banks of the river; and even at the present day a rise of about eighteen feet exposes the lower part of the city and the adjacent country to an inundation. Dulaure, the historian of Paris, in noticing this subject, supplies us with a curious illustration. He says, "I have before me a small volume, in 12mo., in bad condition, entitled *Les Antiquités, Fondations, Singularités des Villes, Châteaux du Royaume*, (The Antiquities, Foundations, Singularities of the Cities, Castles of the Kingdom,) which was printed in 1605, and which experienced an adventure, during the inundation of 1740. On the cover of the volume is the following manuscript note: 'This book was found in 1740, at the time of the high waters. The water was so high that it reached to the second story on the quay of the porte Saint Bernard. This book floated on the water; it entered through the window at the house of —— (Signed) LENOBLE.'"

The breadth of the Seine, in its passage through Paris, varies considerably; its extent in English yards at the principal points is shown in the following table.

	Yards.
At the Pont d'Austerlitz, entire breadth	181
At the Pont de la Tournelle, small arm	106
At the Pont Saint Michel, small arm	53
At the Pont Marie, great arm	90
At the Pont Notre-Dame, great arm	106
At the Pont au Change, great arm	106
Below the Pont-Neuf, where the two arms unite	267
At the Pont des Arts, entire breadth	153
At the Pont Royal, entire breadth	92
At the Pont Louis XVI., entire breadth	160
At the Pont des Invalides, entire breadth	149

The rivulet of the *Bièvre* or of the *Gobelins* which has its source in the neighbourhood of Versailles, joins the Seine soon after that river has entered Paris, thus cutting

* The French mètre is rather more than the English yard; its exact value is 1·093633 yard.

off the south-eastern corner of the capital. After a course of about eight leagues it enters the city across the Boulevard des Gobelins, traverses the faubourgs Saint Marcel, and Saint Victor, setting in motion several mills, and supplying numerous washing, tanning, brewing, and dyeing establishments, and falls into the Seine on the Quai de l'Hôpital, just above the bridge of Austerlitz. Although the ordinary breadth of this little stream is only about twelve feet, it has sometimes caused serious damage by overflowing its banks. An instance is recorded in the year 1479, and another in 1579; the latter is thus related in the *Journal of Henry III.*

"On the night of Wednesday, April 1st, 1579, the river of Saint Marceau, by reason of the rains of the preceding days, increased to the height of fourteen or fifteen feet, knocked down several mills, walls, and houses, drowned many persons who were surprised in their houses and beds, destroyed a great quantity of cattle, and did infinite damage. On the morrow and following days, the people of Paris ran to see this disaster in great terror. The water was so high that it flowed into the church, and even to the great altar of the Cordelières of Saint Marceau, ravaging like a torrent in great fury; nevertheless it lasted only thirty hours or a little more."

The water of the Bièvre has always possessed the reputation of being peculiarly well adapted to the processes of dyeing. For several centuries establishments for dyeing wool have constantly existed on its banks; one of the earliest among them was that of the Gobelin family, which has since become so celebrated as the Royal Manufactory of Tapestry. The impurity however of the water, even before its entry into the city, renders it unsuited to domestic purposes.

In former years, there existed at Paris, besides the Seine and the Bièvre, a small brook, which entered the former upon the northern side of the city. It had its source at Ménilmontant, a village in the north-east; it traversed the northern quarters of the city and entered the Seine on the Quay Debilly, below Chaillot, near the western extremity of the capital. This rivulet, however, was absorbed by the quarries opened beneath it; and it has since suffered a fate similar to that of the Fleet River of our own metropolis, its bed now forming what is called the "Great Sewer" of Paris.

SITUATION AND SURFACE.

Paris is situated in the midst of a large plain, which is encompassed by hills of various heights, and which is known to geologists by the name of the "Paris basin," being regarded by them as probably the bed of an immense lake of which the Seine and the Bièvre are now the only remains. On the northern side of the Seine, a chain of heights extends in a semicircular form from the eastern to the western extremity of the city; it is composed of a succession of hills known by the names of Berci, Charonne, Ménilmontant, Belleville, la Villette, Montmartre, and Chaillot. On the southern side the heights are less elevated, and less strongly marked; the principal are, the plateau of Sainte-Geneviève, which rises about 110 feet above the low-water mark of the Seine; and the plateau of Mont-Souris, on which is erected one of the obelisks, (the other being on Montmartre,) which indicate the direction of the meridian line of the observatory. At a greater distance is a more elevated chain composed of the heights of Villejuif, Rungis, Lal, Bagneux, Meudon, Saint Cloud, and terminating in the celebrated Mont Calvaire, or Mont Valérien, the loftiest of all the hills in the neighbourhood of Paris.

The soil of Paris at the present day is considerably raised above what it was formerly. This has arisen from various causes: the deposits from the inundations of the Seine, the measures taken by the inhabitants to protect themselves from those inundations, as well as to facilitate the drainage of the city, the paving of its streets, and more especially the construction of bridges, which necessarily occasioned an elevation of the approaches, and by degrees, of the adjoining streets. In various places, excavations have led to the discovery of an ancient pavement; for instance, in the Rue Saint-Jacques, (on the southern side of the river,) at the depth of eight feet, and also of ten feet below the actual surface. A writer who saw it at the former depth, tells us that at the same time it was perceived that a second row of pavement had formerly existed between it and the present one. In the Rue du Plâtre Saint-Jacques, nearly all the houses have two stories of cellars; and beneath the modern church of St. Sulpice, a part of the ancient edifice on which it is built, may be seen completely under ground.

It is more particularly in the *Ile de la Cité* that examples of this elevation of the soil are to be found. The pavement of many of the old churches in this quarter used to be eight or nine feet lower than that of the streets; for instance, to enter the chapel of Saint-Agnan, which stood near Notre-Dame, and was destroyed in 1795, it was necessary to descend twenty steps. But the history of Notre-Dame itself affords the most remarkable illustration. At the beginning of the fifteenth century, in the reign of Louis XII, an *ascent* of thirteen steps led into that cathedral; in the middle of last century a *descent* of thirteen steps was necessary. At the present day the pavement of the cathedral is nearly on a level with the soil of the adjoining area or *place*, which was lowered with that view in 1748.

It was principally in the sixteenth and seventeenth centuries that the most considerable elevations of the soil were effected. In 1507 we find the parliament ordering that the street leading across the Ile du Palais from the Petit-Pont to the Pont Notre-Dame, should be raised ten feet; and after 1572, when Catherine de Médicis had built the Hotel de Soissons, the site of which is now occupied by the corn-market, the soil was raised fifteen feet. So late as 1818 and 1819, the streets surrounding the new hall of the Marché Saint-Germain were raised several yards.

In all probability the ground on which Paris stands, at the base of the heights already mentioned, was originally quite level, but at the present day it is disturbed by various inequalities. These are in almost every case the result of artificial causes. In the gradual course of its growth, Paris was fortified by several successive enclosures of ditches and ramparts, and, although these have long since disappeared, they have left many traces behind them, in the unevenness of their site. Wherever gates were opened in the circuit, there were necessarily so many interruptions or breaks in the elevated rampart. This accounts for the frequent inequalities or undulations occurring in the level of the *Boulevards*, formed by Louis XIV., on the site of the "bulwarks" which he demolished.

Another cause of the inequalities in the soil of Paris is to be found in the heaps of filth and rubbish deposited by the inhabitants on spots which were once without the city, but by the enlargement of its circuit came to be included within it. These mounds, called *buttes* or *voiries*, were numerous, and they gradually rose to a considerable height. Among those on the north side of the river were the *Monceau Saint-Gervais*, the *Butte de Bonnes-Nouvelles* or of *Villeneuve de Gravois*, the *Butte Saint Roch*, &c., all of which were levelled as the space they occupied came to be needed. The Butte Saint-Roch so late as the reign of Louis XIV. retained its "agrestic form," with the windmills on its little hillocks; it was demolished in 1667, but not so completely as not to leave several inequalities in the quarter to which it gives its name.

Several other mounds near the northern Boulevards were levelled in the reign of Louis XIV. There stood one of them on the rampart of the Porte Saint-Denis, and during the disastrous famine of 1709 the poor were employed to remove it. For this service they were to receive bread; but one day during the work, the distribution not being made as usual, they rose, under the pressure of hunger, betook themselves to the house in which the bread was deposited, pillaged it, as well as some bakers' shops, and then marched off to the hotel of M. d'Argenson. The French guards, the Swiss guards, and the *Mousquetaires*, immediately mounted their horses, and, to continue in the words of the writer who records these circumstances, "there were some of the rabble killed, because it was necessary to fire upon them, and some others put into prison." Dulaure has well observed that this is the language of a courtier who was not hungry.

Similar artificial mounds were likewise formed in the Ile de la Cité, and on the south side of the river; the latter, indeed, still retains one of them entire. This is the *Butte des Copeaux*, which has been agreeably metamorphosed into one of the ornaments of the *Garden of Plants*, by planting it with evergreens, and disposing its paths into the form of a labyrinth. Its summit rises to the height of about 120 feet, and affords a good view of the garden and the adjacent parts.

It would appear, however, that some of the ancient Buttes were still higher; for in 1512, when a siege was apprehended from the English, it was resolved in an assembly to level all these mounds, which rose much higher than the city walls. It was likewise decided that the inhabitants of Paris should be ordered to deposit their rubbish, &c., in more distant.

places. These measures, however, were not carried into execution, for some years after, in an assembly held on the 29th of March, 1525, Jean Briçonnet, president of the Chamber of Accounts, proposed that the *voiries* which surrounded Paris should be levelled, saying, that there were some of them so high that they commanded the city. The Archbishop of Aix, who was then the governor, considered these voiries as so many fortresses raised against the place. It was determined, accordingly, to level them; but the resolution could not have been carried into complete execution, as we find several of the Buttes existing at subsequent dates.

SOIL OF PARIS; ITS QUARRIES.

The natural soil of Paris is a gypseous marle, but there is above this, in most places, a stratum of foreign matter which has principally been deposited by the river. "The country in which this capital is situated," say MM. Cuvier and Brongniart, "is, perhaps, one of the most remarkable which have ever been observed, on account of the different earths of which it is composed, as well as of the extraordinary remains of ancient organization which it exhibits. Thousands of marine shells, with which are regularly alternated fresh-water shells, form the principal mass; bones of terrestrial animals entirely unknown, even in their kind, occupy certain portions. Other bones of species, considerable in size, and of which we find some congeners only in very distant countries, are scattered in the more superficial series; a very marked character of a great irruption coming from the south-east, is imprinted on the forms of the capes and the directions of the principal hills; in a word, there is no district more capable of instructing us on the least revolutions which have determined the formation of our continents."

One of the products of the soil of Paris and its environs, is an article of considerable commercial importance, namely, the *gypsum* or *plaster* of Paris, as it is commonly called, which abounds in the basin of the Seine, and of which the hill of Montmartre entirely consists. A compact limestone is likewise found in considerable quantities; it is of this that the great buildings in Paris are principally composed. It especially abounds on the southern side of the river, in the high ground or plateau, extending from Choisy to Meudon, in which numberless quarries have been dug to a considerable depth.

It is a remarkable fact, that these quarries penetrate a considerable distance under Paris; in other words, that a very large portion of the French capital is actually undermined. Several of the southern quarters of this metropolis, containing many of its chief public edifices, the Luxembourg, the Observatory, the Odéon, the Val-de-Grace, the Panthéon, Church of Saint-Sulpice, and some of its principal streets, as the Rues de Saint-Jacques, de la Harpe, de Tournon, de Vaugirard, &c., stand upon immense vaults, in which they are liable to be swallowed up. "No great shock is wanting," says a French writer, "to throw down all the stones of Paris into the place from whence they were quarried. The towers, and domes, and steeples, are so many signs which tell the spectator that whatever he sees above his head has been taken from under his feet."

Till towards the latter end of the last century, the existence of these quarries under a great part of Paris, was known only as a popular tradition: the attention of the government was first roused by some alarming accidents which occurred in the year 1774, and in 1776 a survey was made and plans taken. The frightful discovery was then made that "the churches, the palaces, and most of the public ways of the southern quarters of Paris were ready to sink into immense gulfs." A board of engineers was appointed to direct the necessary works, and repair, as far as possible, the faults of past generations, in so inconsiderately raising such vast superstructures at the expense of their natural base. The very day that this body was instituted, a house in the Rue d'Enfer sank down ninety-one feet below the level of its court-yard.

The most remarkable and best known of these subterraneous caverns, are the *Caves de l'Observatoire* and the *Catacombes*. The former are so styled because the descent to them is by a staircase in the observatory; and the latter derive their appellation from the circumstance of their having been appropriated in 1785 for the reception of the bones from the different cemeteries within the walls of Paris. We shall have occasion to speak of them more particularly hereafter.

The greatest known depth of these quarries is seventy-nine metres, or 250 English feet.

THE ANCIENT PARISII.

Most great cities have a romantic and fabulous origin,—the gift of those credulous writers of former ages, who, to use the language of Dulaure, "adopted without hesitation the fictions of the barbarous ages, and sowed the field of history with errors difficult to be out-rooted." The French capital has, in this respect, been liberally endowed,—as much so, indeed, as Rome itself. For if that ancient mistress of the world was founded by a son of Mars, the suckling of a wolf, Paris ascribes its foundation to a Trojan prince, a son of the great Hector, who, escaping from the memorable burning of his native city, betook himself to Gaul, the original country of his ancestors, and by a fortunate marriage became possessed of the throne of that kingdom. The name of this hero was Francus; he first built a new Troy (the modern Troies) in Champagne, to keep up the memory of the old one, and then founded a city on the Seine, to which he gave the name of his uncle, the accomplished Paris. His own name was, of course, kept for the kingdom itself.

The bold fabricators of this preposterous story go still further. They have precisely established the genealogy, and minutely recorded the acts and deeds of the Trojan kings who ruled over Gaul, assigning to each the institutions peculiar to his reign; and to shed still greater lustre on this dynasty, they have generously traced its source to Samothes, the son of Japheth, and grandson of Noah. Jupiter and Hercules figure in the list of Gallic sovereigns, from which they were borrowed by the Greeks.

Setting aside these, and other ingenious fables of a similar cast, let us turn to the evidence of sober history. In the *Commentaries* of Julius Cæsar occurs the first mention of a people called *Parisii*, who dwelt in a district on the Seine, near where Paris now stands. They are shortly described as bordering on the nation of the Senones, to whom they had been united within the memory of their elders. As this description applies to the year 54 B.C., the union probably took place about one hundred years before Christ. What their condition previously was, we do not know; but as fugitive tribes were occasionally permitted by the principal nations of Gaul to settle on their frontiers, and admitted into alliance with them upon particular conditions, the local and political connexion of the Parisii and Senones has been explained by the supposition that the former were a fugitive people, (perhaps from the country of the Belgæ,) thus received by the latter. The territory occupied by the Parisii was of small extent, not exceeding ten or twelve leagues in any direction.

The town of the Parisii was called *Lutetia*; Cæsar describes it as situated on an island in the Seine. That island was the Ile du Palais of modern Paris; being one of the five (now reduced to three) which the river then formed at that spot. No wall encompassed it, the Seine being its only fortification; nor is the name of town strictly applicable to what was at best but a collection of mud hovels resorted to as a place of refuge in time of need. Dulaure maintains that at this period the Gauls had not any towns; but that they dwelt in cabins scattered over the country, and when they feared an attack, retired with their families, provisions, and cattle, into their fortresses, where they hastily built huts for their shelter. The name Lutetia is supposed to be a Latinized form of some Celtic appellation, signifying a dwelling-place in the midst of a river.

Concerning the etymology of the word Parisii, there have been several conjectures. Dulaure thinks that it is not the original name of the people to whom the Senones assigned a territory, but that it was afterwards applied to them on account of their position on the frontier between two of the great divisions of ancient Gaul, namely, Belgic and Celtic Gaul. There were, he says, both in Gaul and in Great Britain, many other geographical positions called *Parisii*, or *Barisii*, the letters *P* and *B* being often used the one for the other, and all those are found to be frontier positions. The conclusion thence drawn is that *Parisii* and *Barisii* signified "inhabitants of frontiers," and that the tribe received by the Senones owed its name of Parisii to its situation on the frontier of that nation. This conjecture, as the same writer observes, is more probable than that which derives the name of Paris from the Trojan prince, or from the Greek word *parrhesia*, signifying "boldness," the inhabitants being so very brave, &c., or from a certain king named *Isus*, or from the Egyptian goddess *Isis*, who has often been erroneously represented as a divinity of the ancient Parisii.

CONQUESTS OF THE ROMANS.

In the year 700 from the foundation of Rome, or fifty-four before the Christian era, Julius Cæsar, being in want of cavalry to extend his conquests, convoked a general assembly of the nations of Gaul. The Treviri, the Carnutes, and the Senones, the most powerful of all, disregarded the summons. The absence of deputies from these nations implied a contempt of the convocation, and hostile intentions towards the Roman general; and moreover presented an obstacle to his projects of conquest. Learning that the feeble nation of the Parisii, although allied with the Senones, had taken no part in the resistance of the latter, he convoked a new assembly in Lutetia, and on the same day marched with his legions against the Senones, who, at his approach, promised to send deputies. The Carnutes followed their example, and Cæsar having succeeded in assembling the chiefs of Gaul at Lutetia, obtained from them a promise to furnish him with cavalry.

In the following year, nearly all the nations of Gaul rose against the tyranny of the Roman conqueror, who, after gaining a victory in Bern with difficulty, and being defeated in Auvergne, was compelled to flee and rejoin the legions which Labienus, his lieutenant, commanded at Agedincum, a place situated upon the frontiers of the Senones. But in the mean while, the nations contiguous to the Parisii having likewise raised the standard of insurrection, Labienus marched with four legions against the insurgents, and, passing along the northern bank of the Seine, advanced towards Lutetia.

The Gauls, upon learning the approach of Labienus, assembled a large force from the neighbouring territories, and placed them under the command of Camulogenus, an aged chieftain of the Aulerci, famed for his military skill; and under his direction they took up a position in the Romans' line of route, behind an extensive marsh on the banks of the Seine, probably near the confluence of that river with the Marne. Labienus at first attempted to fill up the marsh, by means of hurdles, mounds, and other implements of the military art, but finding the task too difficult, he silently broke up his camp in the night, and retraced his steps till he reached *Melodunum*, (the modern Melun,) a town of the Senones, seated like Lutetia on an island in the Seine. Here he contrived to seize about fifty large boats, by the aid of which he speedily made himself master of the place, many of the inhabitants being absent with the confederate forces. Repairing the bridge, which the enemy had destroyed a few days before, he crossed his army over the river, and marched along its southern bank towards Lutetia. The Gauls, when the news of these proceedings reached them, ordered Lutetia to be burnt, and its bridges to be broken down; then quitting their encampment behind the marsh, they took up their station on the northern bank of the Seine opposite that town, the Roman camp facing them upon the southern bank.

At this juncture Labienus became aware of Cæsar's critical position, and his intended march towards Agedincum. This intelligence changed his plans; and it now became his object not so much to provoke the Gauls to battle, as to lead back his army safe to that town. With an active and powerful enemy before him, and nations of doubtful amity all around, he was naturally anxious for the safety of his own troops, separated as they were by the river from their garrison and supplies. In this emergency he had recourse to fresh manœuvres.

He had brought with him the vessels which he had seized at Melun; in each of these he placed a Roman knight, with orders to descend the Seine, in the silence of the evening, four miles, and there await him. Five cohorts (perhaps 2500 men), the least to be relied on in battle, were to remain and protect the camp; the remaining five, of the same legion, were ordered to march up the river, openly and with all their baggage, in the middle of the night, attended by boats rowed with a great noise. Labienus himself soon afterwards set out with the rest of his army—three legions—marched down to the place whither he had sent the Melun boats to await him, and favoured by a sudden storm which relaxed the vigilance of the Gallic scouts, succeeded in quickly transporting the whole of his force, horse and foot, to the northern bank of the Seine.

Towards daybreak the Gauls became informed of these manœuvres; and concluding that the Romans, alarmed at the turn which events had recently taken, were seeking to escape to Agedincum by crossing the river at three places, they divided their army into three bodies likewise. Of these one body remained before Lutetia in the face of the Roman camp; a second ascended the river towards Melun, while the third marched down the stream to meet Labienus, with whom they speedily became engaged in a severe conflict.

This battle is supposed to have been fought on the heights of Chaillot, or in the plains to their west. The left wing of the Gauls was broken at the first shock and put to flight; the foremost ranks of their right were struck down by the Roman javelins, but the rest stood firm, and encouraged by their leader Camulogenus, offered stout resistance. The issue of the fight was for a time uncertain; when the seventh legion coming from the victorious right attacked the Gauls in the rear. "Not even then," says Cæsar, "did any man of them give way; but all were surrounded and slain," their chieftain among them. The arrival of a fresh body of Gauls,—that one which had been left to watch the Roman camp—produced no change in the fortune of the day; unable to sustain the onset of the victorious Romans, they fled with the rest, and "those whom the woods and heights did not shelter were slain by the cavalry." The action being over, Labienus effected his object of regaining Agedincum.

In a subsequent passage of Cæsar's *Commentaries*, the Parisii are mentioned as furnishing a small contingent to the confederate army of Gauls. Thenceforward, for a period of 400 years, history is silent concerning them, as well as their town Lutetia. We are told, indeed, by some ingenious and fanciful antiquaries, that Cæsar, struck with the advantages of its situation, rebuilt Lutetia, surrounded it with walls, and erected two forts at the heads of the two bridges, by which the island was approached from north and south. These assertions are wholly unsupported by historical evidence, yet they are found in modern French works of some repute, and constantly repeated in the best guide-books to the present day.

CONDITION OF PARIS UNDER THE ROMANS.

Soon after the middle of the fourth century a great change took place in the condition of the Parisii—a change which affected the name of their capital. During the four centuries for which they had been under the dominion of the Romans, they had enjoyed none of those privileges which the conquerors sometimes granted to vanquished nations, and which entitled them to the epithet of free, allied or friendly. Their fortress or town, Lutetia, was at no time the metropolis of a province, as were many of the towns of Gaul; and the diminutive appellations applied to it by the writers who mention it, show that it must have been a comparatively small and unimportant place.

The change to which we have referred was preceded by great calamities. In the middle of the fourth century, during the contest for empire between Constantius and Magnentius, the former imprudently encouraged the barbarians of Germany to cross the Rhine, abandoning to them the countries of Gaul, which acknowledged the authority of his rival. Careless of nice distinctions, these formidable allies continued to plunder, burn, and murder, even after the authority of Constantius was fully established. "From the sources to the mouth of the Rhine, the conquests of the Germans extended above forty miles to the west of that river, over a country peopled by colonies of their own name and nation; and the scene of their devastations was three times more extensive than that of their conquests. At a still greater distance the open towns of Gaul were deserted, and the inhabitants of the fortified cities, who trusted to their strength and vigilance, were obliged to content themselves with such supplies of corn as they could raise on the vacant land within the enclosure of their walls. The diminished legions, destitute of pay, and provisions of arms and discipline, trembled at the approach, and even at the name of the barbarians." To remedy this disastrous state of things, the young Cæsar Julian, afterwards emperor, was sent into Gaul by Constantius; and in a short time he succeeded in driving the invaders beyond the Rhine.

When an interval of peace afforded him the necessary leisure, Julian diligently repaired the cities of Gaul, and introduced into them a new and uniform system of government. All distinctions disappeared; the Parisii, and others in the same condition, were placed on a level with the privileged nations, and their chief towns enjoyed the same rights as the *Coloniæ* and *Metropoles*. At the same time, those towns acquired the title of city, and exchanged their original name for the territorial appellation of the people. This change seems to have taken place in the period be-

tween the years 358 and 360. Before that period, the town of the Parisii is always spoken of under the name of *Lutetia*, or *Lucotetia*, or *Leuketia*, &c.; after that period it is more frequently called *Parisii*.

JULIAN MADE EMPEROR AT PARIS.

In the year 360, or shortly after Julian had restored the provinces of Gaul to a condition of safety, Paris witnessed his sudden elevation to the imperial dignity by the unanimous acclamations of the legions of Gaul. The jealousy and fears of the Emperor Constantius had induced him to resolve on disarming the Cæsar, and recalling his faithful troops to employ them in a distant war against the Persian monarch.

While Julian passed the laborious hours of his winter quarters at Paris, in the administration of his office, "he was surprised by the hasty arrival of a tribune and a notary, with positive orders from the emperor, which *they* were directed to execute, and *he* was commanded not to oppose. Constantius signified his pleasure, that four entire legions, the Celtæ, and Petulants, the Heruli, and the Batavians, should be separated from the standard of Julian, under which they had acquired their fame and discipline; that in each of the remaining bands three hundred of the bravest youths should be selected; and that this numerous detachment, the strength of the Gallic army, should instantly begin their march, and exert their utmost diligence to arrive, before the opening of the campaign, on the frontiers of Persia. The Cæsar foresaw and lamented the consequences of this mandate. Most of the auxiliaries, who engaged their voluntary service, had stipulated that they should never be obliged to pass the Alps. The public faith of Rome, and the personal honour of Julian, had been pledged for the observance of this condition. Such an act of treachery and oppression would destroy the confidence and excite the resentment of the independent warriors of Germany, who considered truth as the noblest of their virtues, and freedom as the most valuable of their possessions. The legionaries, who enjoyed the title and privileges of Romans, were enlisted for the general defence of the republic; but those mercenary troops heard with cold indifference the antiquated names of the republic and of Rome. Attached, either from birth or long habit, to the climate and manners of Gaul, they loved and admired Julian; they despised, and perhaps hated the emperor; they dreaded the laborious march, the Persian arrows, and the burning deserts of Asia. They claimed as their own the country which they had saved; and excused their want of spirit, by pleading the sacred and more immediate duty of protecting their families and friends. The apprehensions of the Gauls were derived from the knowledge of the impending and inevitable danger. As soon as the provinces were exhausted of their military strength, the Germans would violate a treaty, which had been imposed on their fears; and, notwithstanding the abilities and valour of Julian, the general of a nominal army, to whom the public calamities would be imputed, must find himself, after a vain resistance, either a prisoner in the camp of the barbarians, or a criminal in the palace of Constantius. If Julian complied with the order which he had received, he subscribed his own destruction, and that of a people who deserved his affection."

But a positive refusal was an act of rebellion; and the peremptory nature of the emperor's commands left no room for deliberation or delay. In the mean while the Cæsar was oppressed by the rude and importunate solicitations of the imperial messengers, who presumed to suggest, that if he expected the return of his ministers, he would charge himself with the guilt of the delay, and reserve for them the merit of the execution. Unable to resist, unwilling to comply, Julian expressed in the most serious terms, his wish, and even his intention, of resigning the purple, which he could not preserve with honour, but which he could abdicate with safety.

"After a painful conflict, Julian was compelled to acknowledge that obedience was the virtue of the most eminent subject; and that the sovereign alone was entitled to judge of the public welfare. He issued the necessary orders for carrying into execution the commands of Constantius: a part of the troops began their march for the Alps; and the detachments from the several garrisons moved towards their respective places of assembly. They advanced with difficulty through the trembling and affrighted crowds of provincials, who attempted to excite their pity by *silent despair or loud lamentations*; while the wives of the soldiers, holding their infants in their arms, accused the desertion of their husbands in the mixed language of grief, of tenderness, and of indignation.

"This scene of general distress afflicted the humanity of the Cæsar; he granted a sufficient number of post-wagons, to transport the wives and families of the soldiers, endeavoured to alleviate the hardships which he was constrained to inflict, and increased, by the most laudable acts, his own popularity, and the discontent of the exiled troops. The grief of an armed multitude is soon converted into rage; their licentious murmurs, which every hour were communicated from tent to tent with more boldness and effect, prepared their minds for the most daring acts of sedition; and, by the connivance of their tribunes, a seasonable libel was secretly dispersed, which painted, in lively colours, the disgrace of the Cæsar, the oppression of the Gallic army, and the feeble vices of the tyrant of Asia. The servants of Constantius were astonished and alarmed by the progress of this dangerous spirit. They pressed the Cæsar to hasten the departure of the troops; but they imprudently rejected the honest and judicious advice of Julian, who proposed that they should not march through Paris, and suggested the danger and temptation of a last interview.

"As soon as the approach of the troops was announced, the Cæsar went out to meet them, and ascended his tribunal, which had been erected in a plain before the gates of the city. After distinguishing the officers and soldiers, who by their rank or merit deserved a peculiar attention, Julian addressed himself in a studied oration to the surrounding multitude; he celebrated their exploits with grateful applause; encouraged them to accept with alacrity the honour of serving under the eyes of a powerful and liberal monarch; and admonished them, that the commands of Augustus required an instant and cheerful obedience. The soldiers, who were apprehensive of offending their general by an indecent clamour, or of belying their sentiments by false and venal acclamations, maintained an obstinate silence; and, after a short pause, were dismissed to their quarters. The principal officers were entertained by the Cæsar, who professed, in the warmest language of friendship, his desire and his inability to reward, according to their deserts, the brave companions of his victories. They retired from the feast, full of grief and perplexity, and lamented the hardship of their fate, which tore them from their beloved general and their native country. The only expedient which could prevent their separation was boldly agitated and approved; the popular resentment was insensibly moulded into a regular conspiracy; their just reasons of complaint were heightened by passion, and their passions were inflamed by wine: as on the eve of their departure the troops were indulged in licentious festivity.

"At the hour of midnight, the impetuous multitude, with swords, and bows, and torches in their hands, rushed into the suburbs, encompassed the palace, and, careless of future dangers, pronounced the fatal and irrevocable words, Julian Augustus! The prince, whose anxious suspense was interrupted by their disorderly acclamations, secured the doors against their intrusion; and, as long as it was in his power, secluded his person and dignity from the accidents of a nocturnal tumult. At the dawn of day, the soldiers, whose zeal was irritated by opposition, forcibly entered the palace, seized with respectful violence the object of their choice, guarded Julian with drawn swords through the streets of Paris, placed him on the tribunal, and with repeated shouts saluted him as their emperor. Prudence as well as loyalty inculcated the propriety of resisting their treasonable designs, and of preparing for his oppressed virtue the excuse of violence. Addressing himself by turns to the multitude and to individuals, he sometimes implored their mercy, and sometimes expressed his indignation; conjured them not to sully the fame of their immortal victories, and ventured to promise, that if they would immediately return to their allegiance, he would undertake to obtain from the emperor not only a free and gracious pardon, but even the revocation of the orders which had excited their resentment.

"But the soldiers, who were conscious of their guilt, chose rather to depend on the gratitude of Julian, than on the clemency of the emperor. Their zeal was insensibly turned into impatience, and their impatience into rage. The inflexible Cæsar sustained till the third hour of the day, their prayers, their reproaches, and their menaces; nor did he yield, till he had been repeatedly assured, that if he wished to live, he must consent to reign. He was

exalted on a shield in the presence and amidst the unanimous acclamations of the troops; a rich military collar, which was offered by chance, supplied the want of a diadem; the ceremony was concluded by the promise of a moderate donative; and the new emperor, overwhelmed with real or affected grief, retired into the most secret recesses of his apartment."

JULIAN'S DESCRIPTION OF PARIS.

In the *Misopogon** of the Emperor Julian, we have a brief but interesting account of Paris as it existed in the latter part of the fourth century. He introduces it in the course of some remarks upon the temperance which he constantly practised in his domestic life; relating an incident which occurred to him in that city.

"I was in winter-quarters in my dear Lutetia, as the little capital of the Parisii is styled in Gaul. It occupies an island of small extent, surrounded by the waters of the river; and is approached on two sides by bridges of wood. It is seldom that the river is affected very much by the rains of winter, or by the droughts of summer. Its pure waters are agreeable to the sight, and excellent to drink; the inhabitants would find it difficult to procure any others, placed as they are in an island. The winter there is not severe; a circumstance attributed to the ocean, which is distant only nine hundred stadia (about 110 miles), and which may from thence afford exhalations capable of tempering the climate. It seems, in fact, that the sea-water is less cold than fresh-water. However that may be, the people of Lutetia have good vines, and even fig-trees, since care has been taken to cover them with straw and other things which protect them from the injuries of the air.

"The year in question, an extraordinarily severe winter covered the river with masses of ice. You know the blocks of white marble which are extracted from the quarries of Phrygia; I cannot better represent to you those enormous pieces of ice which floated at the mercy of the waters, and following without intermission, were ready to unite and form a bridge. I did not choose to have the chamber in which I slept warmed, although in that country most rooms are warmed, and everything was prepared in mine to furnish this convenience. More savage and hardy than ever, I gave myself up to my disposition, and was very properly the first victim of it. I struggled against the rigour of the season, and unrelentingly refused myself an aid which it rendered necessary. The cold increased every day, and at last became insupportable. Nevertheless I contented myself with having some lighted coals brought into my room, fearing that too great a heat might draw out the damp of the walls. But this fire, indifferent as it was, exhaled a vapour which affected my head, and caused me to sleep. I thought that I should have been suffocated; but being carried out, and the physicians having removed the little nourishment which I had taken in the evening, I felt myself relieved."

We do not learn from this description, or from other sources, whether any walls encompassed the island on which the city stood, at the period in question. It is probable that there were none, but that they were added towards the close of the Roman dominion, as they certainly existed at the beginning of the rule of the Franks. The two bridges which Julian mentions, as communicating between the island of the city, and the northern and southern banks of the river, were of wood. That on the south side was called the "little bridge," and stood where the bridge bearing that name at the present day—the *Petit Pont*—stands. That on the north was called the "great bridge," and it occupied nearly the site of the modern *Pont au Change*.

The corporation, or municipal body, established in Paris under Julian's new system of administration, necessarily had an edifice appropriated to its meetings, and the deposit of its records. This was probably the building afterwards known as the *Palais de la Cité*, the site of which is at present occupied by the *Palais de Justice*. The ground on which it stood formed the western end of the island, until the addition made in the reign of Henry the Fourth. At the eastern end, upon the site of a heathen altar, dedicated to Jupiter, is supposed to have been a christian church, consecrated in the name of St. Stephen. It was probably the first cathedral, Paris having already become the seat of a bishopric. In the middle of the island was an open area, or place, appropriated to the purposes of commerce.

* This Greek word, signifying literally, *beard-hater*, was the title of a curious little work of Julian's, containing an ironical confession of his own faults, and a severe satire on the licentious and effeminate people of Antioch, who were disgusted with the rustic simplicity of his manners, and especially with the "beard" which he fondly cherished.

THE PALAIS DES THERMES, OR PALACE OF THE BATHS.

In the southern portion of Paris, at no great distance from the Seine, are to be seen some considerable remains of an edifice of Roman construction, which for the last seven centuries have constantly borne the name of *Palais des Thermes*,—a name which itself indicates a Roman origin. That there existed at Paris an imperial residence, might be inferred from the fact, that several emperors and Cæsars passed the winter there; and such a building is evidently referred to by Julian in the description above quoted. It is, however, distinctly mentioned by the historians who relate the circumstances of his elevation to the imperial dignity. Zosimus speaks of a *Basilica*—a name which in his days signified an imperial palace; Ammianus Marcellinus calls the residence of Julian a *palatium* and a *regia*,—both words denoting a Royal palace. The latter writer also informs us that it contained *latebras occultas*, or secret recesses, into which Julian retired; and a *consistorium*, or hall, in which, after having yielded to the wishes of his troops, he held a council, and into which the soldiers tumultuously rushed when the false report of his death was spread abroad.

The identity of the edifice thus pointed out, with the Palais des Thermes of modern days, is very probable. A constant tradition places a palace on the site of the present ruins; and the historian, Gregory of Tours, in the sixth century, refers to it as the building in which Clotilde the widow of the Frank King, Clovis, dwelt with her grandsons, when their cruel uncles obtained possession of two of them and put them to death, to secure their inheritance. A Latin poet of the seventh century styles it an *arx celsa*, or lofty citadel, telling us likewise, in describing its gardens, that it was the residence of Ultrogotha and her daughters, the widow of Charibert, king of Paris, one of the cruel uncles above-mentioned. In the twelfth century we find documentary evidence of a decisive character; a deed of the year 1136 mentions it, with the appellation of Thermæ for the first time attached to it. A poet who flourished at Paris about 1180, describes it in pompous language as a "house of kings, whose summits rose to the skies, and whose foundations reached to the empire of the dead." &c. Frequent mention is made of the *Palais des Thermes* in subsequent ages.

The ancient palace was evidently of great extent. Southward, its buildings extended to the space since occupied by the celebrated college of the Sorbonne; while northward, they have been traced by antiquaries in cellars, and by the aid of fragments no longer existing, as far as the river. The principal remains are contained within a mass of building formed by the *Rue de la Harpe* on the west, the *Rue de St. Jacques* on the east, the *Rue du Foin* on the north, and the *Rue des Mathurins* on the south. Some years ago, the entrance was by a house which was situated in the Rue de la Harpe, and which, together with the ruins, was the property of a cooper, who used the great hall as a depositary for his casks, and who had it in his power, if he chose, entirely to demolish this interesting monument. But in 1819 the prefect of the department of the Seine purchased this property, and the design was formed of converting it into a museum of antiquities. The houses which concealed the ruins from the Rue de la Harpe, were pulled down; and the necessary steps were taken to protect them from further injury.

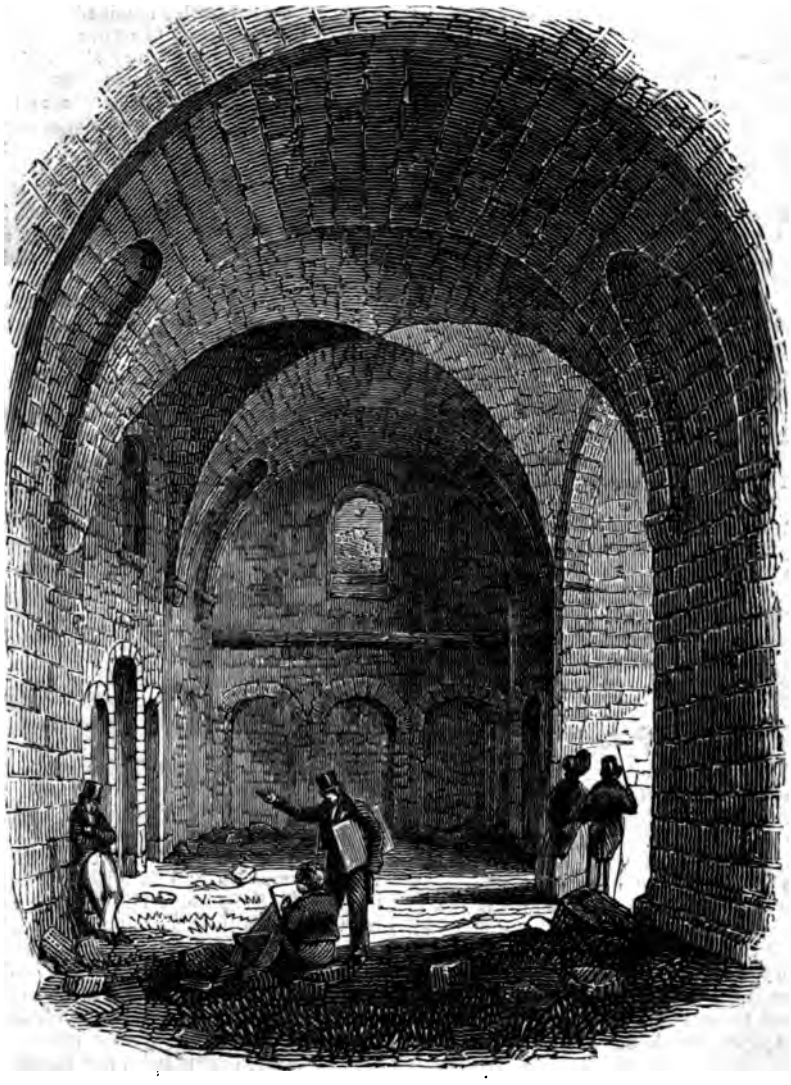
The only perfect part of this palace remaining is a hall, presenting in its plan two contiguous parallelograms, forming together a single room. The largest is sixty-two feet in length by forty-two feet in breadth, and the smallest is thirty feet by eighteen. The semicircularly-formed vault which covers this hall is forty-two feet above the ground; it is substantially built, and above it was, for a great number of years, a thick bed of mould, cultivated as a garden, and planted with trees. The architecture of this hall is plain and majestic. The walls are decorated with three grand arcades, of which that in the centre is the most lofty. In the wall to the south, the central arcade presents the form of a large semicircular recess, in which, as in the lateral arcades, some holes are pierced, which leads to the presumption that they served for the introduction of water to the baths. The vaulting of the roof rests upon consoles, which represent the sterns of ships; in one, some human figures may be distinguished. These sterns, the symbols of water, may probably have served to have characterised

a place destined for baths. The masonry of this hall is composed of alternate rows of squared stones and bricks, covered in some places by a coat of stucco, four or five inches thick. A fine light enters by a circular-headed window, in front of the entrance above the great recess, and precisely under the arch of the vaulting. Beneath this hall are vaulted apartments, which extend to most of the neighbouring houses; and from north to south, along the floor of those under the hall, runs the aqueduct, about two feet wide, and one and a half deep, lined with cement. One of the halls which adjoined that now covered, may still be clearly traced to the west, and part of another is concealed in a house to the south. The subterranean apartment, where the stoves for heating the baths are supposed to have been placed, is seen near the street, and two narrow staircases, in good preservation, lead into it; behind it a well-vaulted sewer carried off the water to the river.

It is matter of considerable doubt by whom, and at what period, this palace was built. According to the common opinion, it was the work of Julian during his residence in Gaul, that is to say, between the latter end of the year 355 and the spring of 361; and it has therefore been sometimes called the palace of Julian. That Julian inhabited the Palais des Thermes is more than probable; but the simplicity of his taste and his severe economy are justly regarded as strong arguments against the supposition that he built it, especially when it is considered that the period of his administration in Gaul was a critical one, in which all his energy must have been directed to other objects of greater importance to the welfare of the state than the construction of a work of luxury and magnificence. Dulaure thinks that the building of this palace should rather be attributed to Diocletian's colleague, Constantius Chlorus, who resided in Gaul during fourteen successive years, from 292 to 305, a period of peace favourable to such an undertaking. A strong argument in favour of this supposition is derived from the fact that a considerable resemblance exists between the masonry and architecture of this palace, and those of the Thermæ built by Diocletian about the same period at Rome*. Adjoining the palace was a large garden, which in after times was known by the name of the *Clos de Lias*, or *Laas*.

Various other antiquities of Roman origin have been at different times discovered at Paris. Among them are the remains of two aqueducts, those of Arcueil and Chaillot. The former we shall have occasion to notice hereafter, as it has been repaired and converted into a modern water-course. The latter was a subterranean aqueduct which began at the heights of Chaillot, traversed the spot which now forms the Champs Elysées and the garden of the Tuileries, and probably terminated at about the middle of the garden of the Palais Royal. In 1763, when the Place Louis XV. or De la Concorde was formed, the pipes of this aqueduct were discovered; but the researches made in 1781 in the garden of the Palais Royal, led to more interesting results. Towards its southern extremity, three feet below the surface of the soil, was found a basin or reservoir of Roman construction, square in form and measuring twenty feet on each side; and at the same time were discovered medals of Aurelian, Diocletian, Magnentius, and other emperors.

* See *Saturday Magazine*, Vol. XI., p. 46.



PART OF THE REMAINS OF THE ANCIENT ROMAN PALACE OF THE BATHS.

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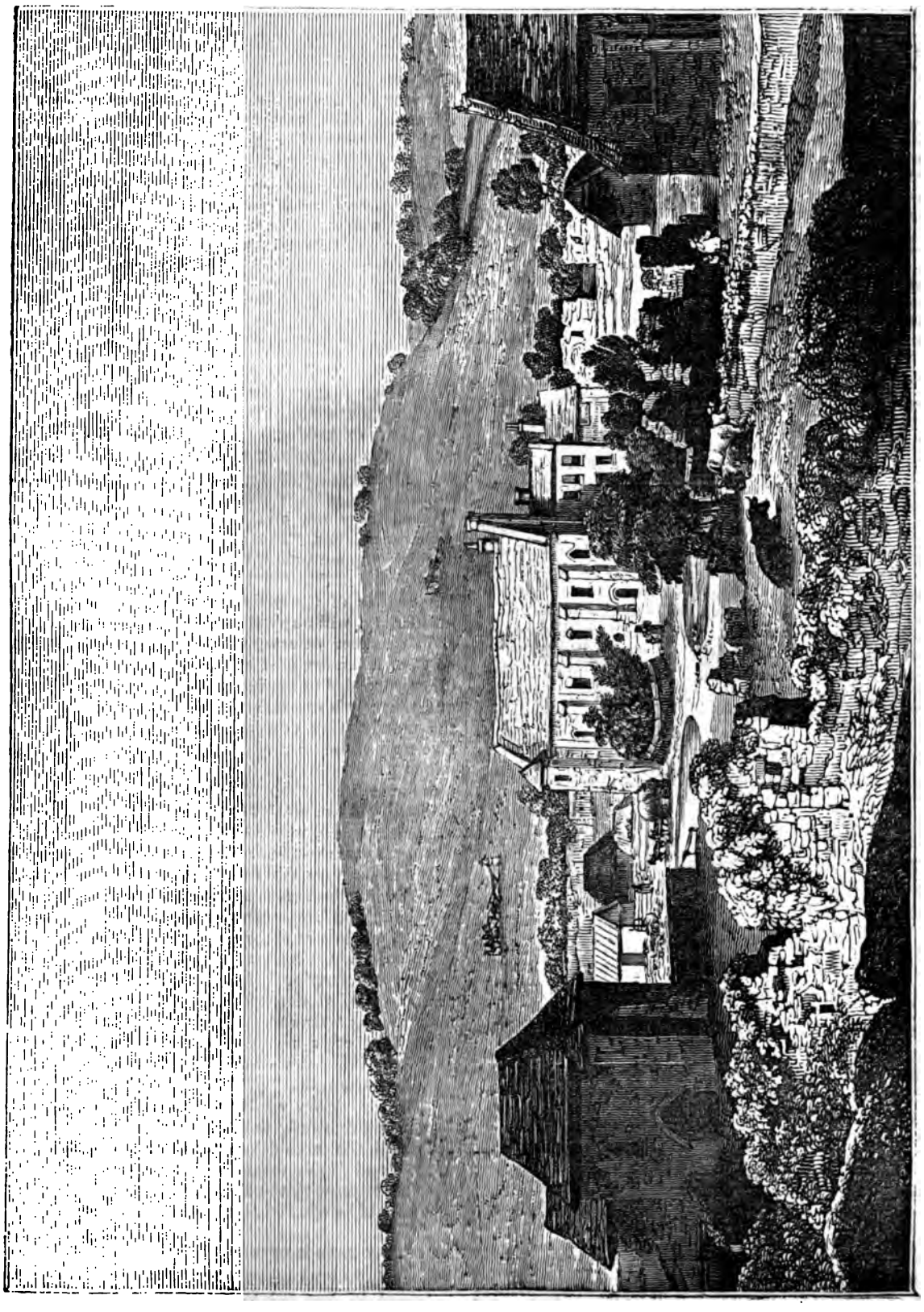


DOVER PRIORY, KENT.

DOVER PRIORY, KENT.

By referring to some previous numbers of the *Saturday Magazine**, the reader will find much information respecting various parts of Dover and its vicinity. We propose, on the present occasion, to give an account of the ancient PRIORY at Dover, part of which still remains as a record of by-gone times.

The history of this religious institution carries us back to times anterior to the Norman conquest. Ancient chronicles inform us that Withred, king of Kent, built a church and several other edifices in the town of Dover, for the accommodation of twenty-two secular† canons, whom he removed from the castle. To the canons of this church, which received the name of St. Martin's church, was granted the privilege of exemption from the jurisdiction of any persons except the kings of England and the pope. This privilege, together with grants of land which they received, gave the canons considerable power, which excited the jealousy of many of the Kentish barons; for, as early as the time of Harold, two of their manors were seized by Alnod, the thane of the district.

When William of Normandy conquered England, the estates of the canons of St. Martin were surveyed and valued, and they yielded a revenue of 48*l.* 6*s.* 4*d.*, the lands being held in common by the prebendaries. The sum here mentioned was a large one in those days.

With regard to others of their possessions, it is recorded that one Ralph Columbels had taken from them a pasture, Robert of Romney a salt-work, and a fishery worth *twenty pence* yearly. Hubert, the son of Ino, gave to the bishop of Bayeux a mark of gold, to permit him to take possession of a mill which belonged to the canons, and he held it, contrary to all right. Lambart also took from them one mill, Woodward another, and Ralph Curbspine a third. The canons had three churches in the town, worth 1*l.* 10*s.* 8*d.*, a garden and a pasture at Medredive, valued at 9*s.* 4*d.*, and another at Sibbertswould, worth 1*s.* 4*s.* They also had ten mills and one half of a mill, worth about 12*l.*, and the annual payment which they made to the archbishop was 2*l.* 15*s.*

Such was the position of the canons of St. Martin about the time of the Conquest, and they continued uninterruptedly in the possession of their revenues and influence until the year 1132. For some time previous to this date various complaints had been made from different quarters against the canons. Being answerable to no one but the king and the pope for their conduct, they were accused of having often overstepped the bounds of decorum, both in the internal arrangements of their house, and in their intercourse with the inhabitants of Dover. William Corbois, archbishop of Canterbury, having no sort of control over them, complained to Henry the First of their conduct, and boldly said that the king must be responsible for the faults of the canons, if he did not delegate to some one the power to check them.

These complaints were repeated year after year, the canons being accused of gallantry, worldly pursuits, dissipation, and wasting their revenue in extravagant luxuries. In their defence, it has been said by Mr. Lyon, in his *History of Dover*,—

> Many of the religious societies were at that time frequently put to heavy expenses, by the nobility, gentry, and others, who visited them, when travelling either on business or pleasure, and they expected that the ecclesiastics would treat them hospitably. As they were situated in a town through which there were many passing to and from the Continent, they were obliged frequently to receive visitors, and to spend large sums in entertaining them. The religious orders in the time of Edward the First found that having so many persons to accommodate was such a heavy burden, that their income was insufficient to support their expenses, and to use hospitality to the poor.

However, extravagant expenditure being one of the many charges brought against the canons of Dover, a formal complaint was made by the archbishop, in the presence of the king, queen, and many of the nobility, at Canterbury; and the prior and brethren of the priory of Christchurch at Canterbury joining in the complaint, they succeeded in having the revenues of the canons made over to them, so that the order at Dover became the property of Christchurch.

The archbishop thereupon laid the foundation of a new building in the fields, not far from the town, in the year 1132, and he had the work carried on with such expedition, that it was finished in four years, with all its extensive buildings. This new building he called DOVER PRIORY.

The archbishop had himself been one of the canons of Dover, and he proposed placing the canons of Morton in his new priory, with permission for them to elect a superior out of their own body. From this period there ensued a succession of violent and discreditable proceedings, since there were three parties who conceived they had a right to the revenues of the priory, viz., the canons who had been displaced for alleged misconduct, the prior and brethren of Christchurch priory, Canterbury, to whom the king had granted the said revenues, and the canons of Morton, to whom the archbishop had granted them.

The archbishop commissioned two bishops to consecrate the new priory, and sent the canons of Morton to take possession; but the monks of Christchurch thinking themselves wronged by this arrangement, protested against, and threatened to appeal to the pope for redress. The archbishop was so chagrined at this disappointment, that he fell ill and died; and the canons of Morton having thus lost their patron, the monks of Christchurch took possession of the new Priory, without waiting for its consecration.

The former canons, finding themselves deprived of their revenues, first by one party, and then by the other, appealed to the king, the bishop of Winchester, and the pope's nuncio; the result of which was, that the monks were compelled to quit the Priory, and give up possession to the original canons. These retained possession for a few years; but when Theobald was made archbishop of Canterbury, he gained the good-will of the monks by giving them possession of the priory again, to the exclusion of the poor canons. This grant was confirmed in a formal manner by the king and the pope, and the monks took the order of the Benedictines, in obedience to the wish of their patron Theobald. But here again was a new source of discord: the new settlers at the Priory, who were a section of the monks of Christchurch, claimed the privilege of choosing their prior from among themselves; whilst the monks of Christchurch wished to choose a prior from among *their* own body, at Canterbury.

At last, after repeated contests throughout the reigns of Henry the Third and Edward the First, the monks of Canterbury petitioned Archbishop Peckham to give the Priory wholly up to them, on the plea that it was rightfully theirs from the beginning. The king and the archbishop together investigated the matter, and finally determined that the monks had nothing to do with the Priory, and that the Benedictines should be allowed to choose their own prior.

This privilege remained untouched for half a century; but there happening, in the reign of Edward the Third, to be a vacancy of some length in the occupation of the see of Canterbury, the monks of

* See *Saturday Magazine*, vols. iii., p. 154—v., 132—x., 112, 138.

† *The term secular* here implies that the canons were not bound by *monastic rules.*

Christchurch seized the opportunity to renew their old claim, and the Benedictines found themselves under the necessity of defending their rights. Under the plea that, as there was then no archbishop, the monks had ecclesiastical authority in the diocese, they commanded the Benedictines to swear fealty to them. This the latter refused, and sent one John Stokes to Canterbury, in 1348, to defend them in their refusal. After much contention the monks gained the day, and Edward the Third annexed the Priory of Dover to that of Canterbury.

This, then, is a brief account of the extraordinary contests for the Priory of Dover, which continued for upwards of two hundred years; and the whole furnishes us with a view of the violent and rapacious tone of behaviour which distinguished those periods of English history. The Priory of Dover, after its annexation to that of Canterbury, "continued," says Mr. Lyon, "under the control of that society, until the general dissolution of monasteries; and they ruled it with an iron hand."

The surrender here alluded to was the general breaking-up of all monastic establishments in England, in the reign of Henry the Eighth. That monarch sent commissioners to estimate the value of all monasteries, priories, nunneries, &c., which, with but little regard to justice or compassion, he seized for the use of himself or his favourites. Dover Priory shared the same fate as the rest. The commissioners took possession of the Priory, Nov. 17th, 1536, sold enough of the effects to pay the debts of the Priory, and sent all the rest to the Tower of London. The king gave the Priory, with the lands, tithes, and buildings belonging to it, first to the Bishop of Dover, and afterwards to the Archbishop of Canterbury, to which see they have belonged, we believe, ever since. The annual income of the Priory, at the period of its dissolution, was 232*l.* 1*s.* 5½*d.*

The ruins which are still remaining of this Priory are of considerable extent, and are surrounded by a stone wall. The exterior structure of the Refectory, which is more than a hundred feet long, and still entire, has been converted into a barn. The gateway is also in tolerable preservation: part of the church or chapel still remains, and a farm-house, rebuilt not many years ago, stands among the ruins.

MECHANICAL POWERS. III.*

2. The Wheel and Axle.

All forms of the lever described before, have this disadvantage, that the weight can only be moved through a very small distance without great inconvenience. Suppose, for instance, it were required to move a resistance of 100 lbs. through a space of one foot by a power of one pound; that power must move through a space of 100 feet, by whatever machine we effect it, but it will be much more convenient to make fifty strokes with the arm, each two feet long, or describe fifty circles, each two feet in circumference, than to make one great stroke of 100 feet, or move the arm once round a circle of 100 feet in circumference. It is in order to make the motion of the power more easy and convenient, that that most useful and elegant contrivance, the Wheel and Axle, is so extensively employed. It is nothing more than a peculiarly shaped lever, and acts on the principle explained in the first of these papers; viz., *that when two bodies revolve in equal times round the same centre, that which is farthest from the centre moves with the greatest velocity.* Thus the inhabitants of tropical countries are carried round by the earth's daily rotation more rapidly than we are, because they are farther from the earth's axis.

A wheel used in machinery differs from those employed for facilitating the motion of carriages, in this,—that it is fixed firmly on its axle, so as to form as it were one instrument; whereas the wheels of carriages are allowed to run loosely on their axles. It is of the former kind of wheel only that we are now about to speak: of course, such a wheel cannot be turned without also turning its axle, nor can the axle be turned without turning the wheel. Now any force applied at the circumference of such a wheel must possess greater velocity, and therefore greater momentum, than a similar force applied to turn the axle. Try to turn round any wheel (as the fly-wheel of a roasting-jack) by applying your hand to the circumference, or outer edge, having previously placed a heavy weight on the wheel, and you will find it very easy to turn it. But now, letting the weight remain in its former place, try to turn the axle, and you will find it more difficult to do so. The reason of this will appear more evident by considering that in both cases you move your hand with the same velocity; for instance,—an inch in a second. Now, suppose the circumference of the axle to be two inches, and that of the wheel forty inches: if you move the axle round at the rate of an inch in a second, it will revolve once in two seconds; and the whole wheel will revolve with it in the same time; so that the circumference of the wheel must of course move at the rate of twenty inches in a second. But when you turn the wheel by applying your hand to the circumference, if you still move your hand at the same rate as before, the rim or circumference will only move with a velocity of one inch in a second; and no wonder then that it is more easy to turn it at this rate than at that of twenty inches per second! But, if it were required in both cases to move the wheel with the same velocity, you would find it no easier to do so by applying your hand at one part than at the other. Thus, you will find it as difficult to move your hand round the circumference, at the rate of twenty inches per second, as round the axle at one inch per second: for *to move the same weight with the same velocity, the same power is always required.*

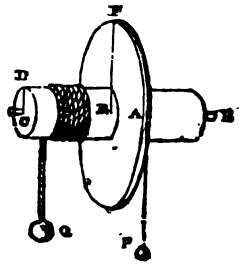
The most simple method of applying the power of gravity to turn a cylindrical body, is by winding a rope or string round the cylinder, and hanging a weight to the bottom of the rope. The gravity, or downward tendency, of this weight causes the string to unwind itself, and in so doing to drag round the cylinder, which continues to revolve as the weight descends, till all the string is unwound, or the weight meets with some obstacle on which to rest. The wheels of a roasting-jack, and those of a clock, are both moved in this manner. Now, suppose the same cylinder (or *barrel*, as it is technically termed) to have two cords wound on it in opposite directions, each having a weight, so that one weight tries to pull the barrel round in one direction, while the other pulls in a contrary direction. If the two weights be equal they will of course counteract each other, and no effect will ensue; that is, they will be *balanced.* But, if they be unequal, the heavier will preponderate, and drag the barrel round; but the same motion which unwinds this cord will wind up the other; and thus while the heavier weight descends, the other will ascend, not as in the lever, through only a small space, but they will continue to move as long as the length of the cords will allow. But this only holds good as long as the two parts of the cylinder on

* This article has been accidently misplaced: it should have appeared before No. IV., already printed at page 92.

which the two cords are wound are of equal size. If one part of the cylinder be larger than the other, two equal weights no longer balance each other; but that which is wound on the larger part of the cylinder will preponderate.

Now a wheel and its axle may evidently be considered as two cylinders of very unequal sizes, fixed together, so that they must revolve together in the same time. If, therefore, one weight be hung to a string wound round the rim of the wheel, and another weight be attached to a string wound round the axle in a contrary direction to the former, it will require the latter weight to be much heavier than the former in order to balance it. If, for instance, the diameter of the wheel be twelve feet, and that of the axle one foot, it will require a weight of twelve pounds on the axle to balance one pound on the wheel, and if the power applied to turn the wheel exceed one pound, it will raise a weight, or overcome a resistance, of twelve pounds acting on the axle. Thus there is a great gain of power. The reason of this is, that there is a similar loss of velocity. The circumference of the wheel is about thirty-six feet, while that of the axle is only about three feet; therefore, any part of the rim of the wheel, or any weight attached to it, moves through a space of thirty-six feet, while a weight attached to the axle moves in the very same time through a space of only three feet. The gain of power may thus be accounted for, by considering the wheel and axle as a lever of the first kind; thus in the following figure the line A E or F E may be considered as a lever having its fulcrum at E; the power P, applied at the end A, and the resistance Q, acting at D, when, of course, the power P must bear the same ratio to Q that the smaller arm of the lever A E does to the larger arm; the former of which is the radius of the axle C B, and the latter that of the wheel.

Fig. 9.



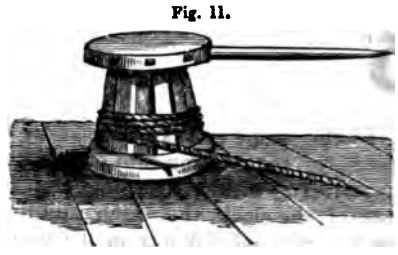
Thus we see that the whole of the wheel is not necessary, when the power of the hand is applied. In that case, there need only be a bar or lever A E projecting from the axle, and having the power applied to the end of it. This is the case in the windlass and capstan, two very useful machines for raising or moving great weights.

The construction of the common windlass for drawing up a bucket out of a well is too well known to need description here. But the reader will observe that it acts on the principle of the wheel and axle, and that the power gained is in proportion as the motion of the hand is quicker than that of the bucket; or in proportion as the circle described by the hand is larger than that described by the rope, as it winds itself on the barrel. Hence, the longer the winch is, and the smaller the barrel, the less exertion will be required in drawing the water. But the circle described by the hand cannot conveniently be made to exceed two feet in diameter, or about six feet in circumference. Now, suppose the diameter of the barrel to be three inches, its circumference will be about nine inches, or one-eighth of the circle described by the hand. While, therefore, the hand moves through eight feet or yards, the bucket will only be drawn up one foot or yard; and in order to draw the bucket up a well twenty feet deep, the hand must move through 160 feet. But this loss of velocity is made up by a corresponding gain of power; *for, in order to raise* a bucket weighing eighty pounds, the power exerted by the hand need not exceed ten pounds. These remarks apply also to all other mechanical operations in which a winch is used, as in winding up a clock or jack.

Fig. 10.

The capstan is a machine used principally in naval operations, as in weighing anchor. It is represented in the following figure, and consists of a kind of windlass placed vertically, instead of horizontally.

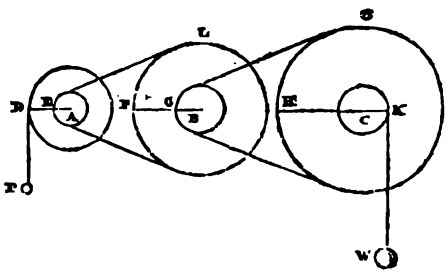
Fig. 11.



The head of the capstan has a number of holes through which long poles can be inserted, (only one is inserted in the figure) and each of these poles can be pushed round by several persons walking behind it. The great advantage of the capstan is that several men can work at it at once. Thus the most usual number of poles is eight, and each of these is seldom shorter than to accommodate five persons; thus forty men can all work together at one moderate-sized capstan.

Sometimes, when it is desirable to increase velocity at the expense of power, the power is applied to the axle of a wheel in order to turn it. This is the case in the contrivance called the *crank*, which is almost always used in all kinds of steam-engines. In order to increase velocity one wheel is made to act on the axle of another, and the circumference of that on the axle of the next, and so on. Such a combination is called *a train of multiplying wheels;* and by them any degree of velocity may be produced, provided the original moving power be sufficiently large to sustain so great a diminution. This is effected in two methods.

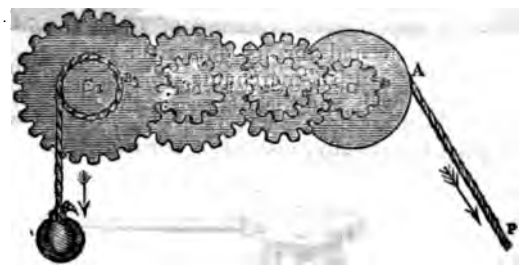
Fig. 12.



In the first of these figures, the rim of the wheel O is made to act on the axle of the wheel L, by an endless band passing round them; so that the circum-

ference of the axle B revolves with exactly the same velocity as that of its driving wheel O. The circumference L must therefore revolve much more quickly than O, because it makes one revolution in the same time that B does round the same centre. In this manner the wheel D must move still more rapidly than either of the others. In this combination, the force of P is to the force exerted on the band E L, as the radius of the axle A E to the radius of the wheel A D. The force of E L is to the force of G O, as B G is to B F; and the force of G O is to the force at K, or the weight W, as C K to C H. Hence the power P is to the weight W, as the radii of all the axles multiplied together to the radii of all the wheels multiplied together. If the radii of the axles be, for instance, 1, 2, 3 inches, and of the wheels, 3, 6, 9 inches, respectively; then the power P is to the weight W, as $1\times2\times3=6$ is to $3\times6\times9=162$; or as 1 to 27.

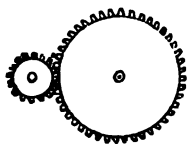
Fig. 13.



In fig. 13 the same end is obtained by the wheels having teeth, or cogs, fitting into one another so that one cannot turn without turning the rest. The mechanism of the clock, the watch, and the roasting-jack, consists principally of a train of wheels like this: but, when great power is required, the order is reversed; the axle of each wheel acting on the rim of the next, so that the velocity is greatly diminished, but the power increased. This is the case with jacks and cranes used for hoisting great weights. In all these cases the smaller wheels are called *pinions*, the larger only retaining the name of *wheels*.

When one wheel acts upon another by teeth, in order to preserve uniformity of motion, the teeth must be so cut that they may go smoothly between one another; so that the proportion between the power and weight shall not be altered as the wheels revolve.

Fig. 14.



In these wheels, the number of revolutions which a wheel connected with another will make, for one revolution of the first wheel, will be known, if the number of teeth be known. Thus, if the large wheel contain 48 teeth, and the small one 16, the latter will revolve three times as fast as the former; which is constantly exemplified in clock-work.

In the common spinning-wheel, a very rapid motion is given to a spindle, by means of a strap passing round a larger wheel.

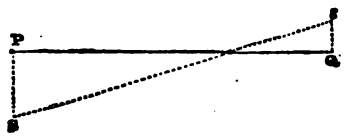
The woman who spins gives motion to the large wheel, by pressing upon the spokes of the wheel near the centre; whereby she makes its circumference move more rapidly than her own hand at the time of communicating the motion. This motion is communicated to the small spindle on which the thread is wound, by means of the strap; so that the spindle is made to revolve some hundreds of times for every turn of the larger wheel.

Now, in order that the machinery of the wheel and axle may be useful *in doing work*, the power and weight must no longer correspond, as at figs. 9, 12, and 13. Let us, bearing in mind the action of the common lever, suppose that P descends through the space P s,

Fig. 15.

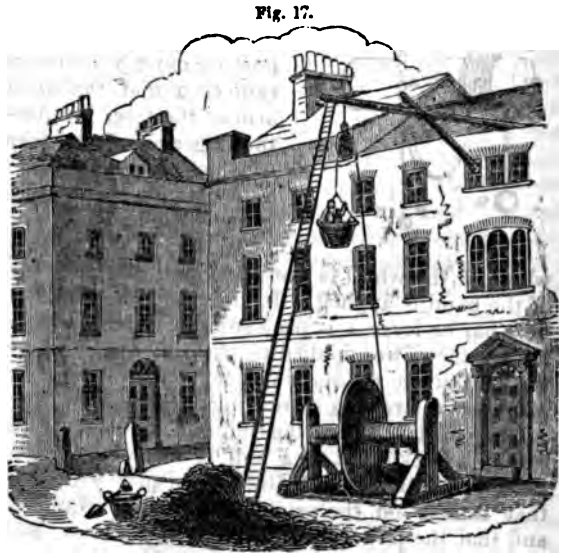
and that, in consequence, the weight Q is raised through the space Q s. Here it is manifest that P and Q are not balanced horizontally; but they will be

Fig. 16.



balanced in the line S s, if P, multiplied by the spac P s, be equal to Q, multiplied by the space Q s. The space Q s is to the space P s, with the wheel and axle, as the radius of the axle to the radius of the wheel.

Fig. 17.



The pressure, multiplied by the space which it passes through, is the *measure of the power of a machine*. Thus, suppose a man, whose weight is 160 lbs., goes up a ladder, 30 feet high, and descends in a bucket, as in the cut below; the force by which he does this, measured in pounds and feet, is $160\times30=4800$; and this force may be caused, as has been before shown, to raise a weight (for instance) of 10 lbs. through a space of 480 feet; or a weight of 480 lbs through a space of 10 feet.

THE following is a negro's definition of a gentleman. "Massa make de black man workee—make de horse workee—make de ox workee—make ebery ting workee, only de hog—he no workee; he eat, he drink, he walk 'bout, he go to sleep when he please, he liff like a gentleman."—*West India Paper.*

SEAT OF WAR IN THE EAST.

No. III.

THE AFGHANS, BELOCHEES, &c.—CAUSE OF HOSTILITIES.

The *inhabitants of Afghanistan* are formed into two great divisions,—those who live in tents and those who reside in houses; the former occupying one half of the western portion of the country. The chief characteristic of the Afghans is an attachment to pastoral life: those who remain in towns being mostly held in disdain by the nomades;—the towns-people are principally *Taujiks*, supposed to be the original tribe who were subdued by the Afghans, and are believed to amount to 1,500,000 in number.

The manners of the Afghans are frank, and their hospitality is so unbounded, that it is said a stranger might travel from one end of the country to the other without money. Robberies are, however, frequent among the ruder tribes, though never acccompanied with murder.

The qualities of the Afghan people have been summed up as thus: they are faithful, brave, hospitable, frugal, prudent and laborious, but they are also revengeful, envious, rapacious and obstinate. Though the Afghans are Mohammedans, they are tolerant; for Hindoos and Christians live peaceably and are respected among them. Their language is called Pushtoo, about one half of the words are Persian, the rest of an unknown origin.

Education is not neglected; there are schools in every village, which is usually attended by a priest. Some boys are sent entirely away from their parents to live in a mosque. The most celebrated university is at Peshawar.

The form of *Government* in Afghanistan is that of a limited monarchy:—each tribe has, beside a supreme head or *Khan*, a *jeerga* or representative-assembly, without whose concurrence, the Khan can undertake nothing. The tribes form separate states, and often make war upon each other. The regular and disciplined army of Afghanistan is about 13,000 strong: beside a militia of 12,000 men, each fighting under the banners of their chieftain.

A *history* of such a people as the Afghans would be nothing more than a record of petty warfare carried on between rival tribes for disputed territories. Some events of a late date, we shall, however, presently state, as necessary to convey a proper understanding of the present position of affairs.

Beloochistan is governed by an independent chief, whose subjects have been described as brave, hospitable, but "honorable" robbers, who make *chepaos* or raids of eighty or ninety miles to burn villages and carry off the inhabitants as slaves; but whoever claims or purchases their protection is treated kindly and secured from harm. Conjoined with the Belochees, are the Brahoves, who are supposed to be the aborigines of Beloochistan, and are mild, innocent and pastoral, occupying little villages, situated on the bosoms of the mountains; while the people of the Leia province, are described as caring neither for "King, Khan, God, nor the Prophet," being pre-eminent for their rapacious and predatory habits: but keep their faith when they pledge it. One English traveller, having secured the friendship of their chief, was assured that, "while under such protection he need fear nothing mortal." The province Mekran is infested by banditti, called *Loories*, who have renounced every religious belief, and are of a more base and brutal character than the most abandoned Asiatic hordes; they not only plunder and murder without scruple, but are guilty of every species of depravity.

The *Ameers*, who chiefly inhabit the Sinde, are so exceedingly fond of hunting, that they have laid much of the country waste, or converted it into jungles. They have a great desire for the acquisition of jewels and arms, and their collection of musquets and sabres, ornamented with gems, is supposed to be the most extensive in the world. They are intolerant Mohammedans, and persecute with relentless malignity all who profess the Hindoo religion.

Punjàb is inhabited by a powerful religious sect, Seiks, under Runjeet Singh. The rude habits of these people are described as unfavourable to commerce and prosperity; but their degraded state is more to be attributed to repeated incursions of the Afghans and Persians, than to rooted evil habits; for having sought the protecting influence of the British Government, their social state is rapidly improving. They have, in many instances, adopted the European methods of farming, and are truly alive to the advantages of intercourse with civilized countries.

In 1832 the Governor-general of India concluded a treaty, which had for its object the navigation of the Indus by British merchants, to which Runjeet Singh, the Nawab, and the Ameers of the Sinde, were parties. Continued disturbances have, however, as yet defeated in a great measure the objects of this excellent treaty.

To afford an insight into the causes which have given rise to the present hostilities, we must return to the Afghans, and mention a few facts illustrative of the position in which they stand in relation to the Persian and British interests.

In 1809 Shah Soojah governed Cabùl, but was deposed by its former ruler, Mohammed, and obtained an honourable asylum in the British Indian territory. Mohammed was reinstated on the throne, principally by the influence of a powerful chief, named Kutteh Khan, who was appointed Grand Vizier. The king's son, Kamraun, having obtained the government of the province of Kandahar, became jealous of the influence of the vizier, and, contriving to get Kutteh Khan into his power, put the unfortunate chief's eyes out, and he was ultimately murdered by order of Mohammed.

This act of cruelty so enraged the Baurrickzyees, a most powerful tribe, that they deposed Mohammed, who, with his son Kamraun, flew to Herat, and the territory of Cabùl was shared amongst the brothers of the deceased vizier.

The kingdom of Cabùl is at present under the sway of the cleverest and boldest of these brothers, Dost Mohammed Khan. Mohammed, whom his tribe deposed, died of a broken heart at Herat, and his son Kamraun it is who made such a brave and successful defence of Herat, which the Persians attempted in vain to recover; as the first step it was conjectured towards marching to the frontiers of British India.

It is proposed by the English government in India to replace Shah Soojah (who still is under British protection) on the throne of Cabùl by force of arms, as a prince, who from gratitude would rather further than oppose our interests, which are in danger from the intrigues of the Persian court, aided, it is supposed, by a powerful ally.

IT is very true that precepts are useful, but practice and imitation go far beyond them; hence the importance of watching early habits, that they may be free from what is objectionable; and of keeping before our mind, as much as possible, the necessity of imitating the good and the wise; without settled principle and practical virtue, life is a desert; without Christian piety, the contemplation of the grave is terrible.—SIR WILLIAM KNIGHTON.

ON ARROW-ROOT AND SALEP.

THESE are two vegetable productions which are much valued on account of the large amount of nutritious matter which they contain within a given bulk.

Arrow-root is a kind of starch, manufactured from the root of a plant, the *Maranta arundinacea*, which is cultivated in gardens, both in the East and West Indies. The tree is an herbaceous perennial, and is propagated by parting the roots. Its height is from two to three feet; the leaves are broad and pointed; the tree bears small white flowers, in clusters, and globular fruit, of the size of currants. It is much cultivated, both for domestic use, and for exportation, in the countries which we have named. The term *arrow-root* is in some respects misapplied to this plant. The Indians used to employ the root of the *Alpinia galanga* for extracting the virus communicated by poisoned arrows, and it used to be supposed that that was the same plant which yields the substance known by us under the name of arrow-root; but the plants are now known to be different.

The arrow-root of commerce is prepared from the maranta, in the following manner: the roots, when about a year old, are dug up, and well washed, and beaten in deep wooden mortars, until they are reduced to a milky pulp. Instead of being beaten, they are sometimes grated. This pulp is then thrown into a large portion of clear water, and after the whole has been agitated for some time, the fibrous parts which are found among it are carefully separated, squeezed, and thrown away. The pulp, or milky liquor which remains, is a mixture of a kind of starch with water, and is strained through a hair sieve or coarse cloth, to separate the fibrous portions which may still remain mixed with it: it is then suffered to stand for some time, till the starch has settled at the bottom. The water is then drawn off, and the white pasty mass remaining at the bottom is again washed in a separate portion of water, and allowed to subside as before. This process is sometimes repeated three, or even more times, if it be wished to prepare the powder exceedingly fine. When the pulp is considered to be sufficiently cleansed, the water is entirely drained off, and the pulp is dried on clean white cloths in the sun. It then forms an extremely pure starch, which, when reduced to powder, is the *arrow-root* of commerce. It is at once fit for consumption, and will keep for a very considerable length of time.

M. Poiret, in the *Dictionnaire des Sciences Naturelles*, thus speaks of arrow-root:—

This species of the maranta was brought from the East Indies to Jamaica, more than half a century ago, by an English captain. It was at first cultivated as a curiosity, and as a remedy for the wounds made by the poisoned arrows of the savages. This property has been questioned; but other valuable qualities, the existence of which does not admit of doubt, have induced the planters of Jamaica to make a mercantile speculation of its culture. Very considerable plantations of it exist. When the stalks are dried, the roots, or rather the shoots or suckers, are cut off, which are sometimes more than a foot long, and an inch or an inch and a half in diameter. These shoots, when boiled and seasoned, are very wholesome, in the same way as other similar roots. But the most important use of them is for the preparation of an abundant, wholesome, and nourishing starch, or fecula. This forms one of the most agreeable kinds of food for children. A kind of cream is also made of this starch, to which sugar and aromatics are added: besides being agreeable to the taste, it is nutritious for the stomach. English physicians, even at London, order this fecula to be taken by their patients, where they would, in other cases, order sago. It constitutes an important article of commerce between Jamaica and London, and the cultivation of the plant is increasing.

Mr. Macculloch informs us that the arrow-root entered for home consumption has lately amounted to the large quantity of 450,000 lbs. a year.

Salep.—We must now direct our attention to the other of the two articles named at the head of this paper, and which bears many points of resemblance to arrow-root.

Salep is derived from the *Orchis mascula*, a plant much cultivated in the East, for the sake of its root, which forms a considerable portion of the diet of the inhabitants of Turkey, Syria, and Persia. There are many different species of the orchis; but it is from that called the *mascula* that the starchy substance called *salep* is prepared.

The *Orchis mascula* consists of a root, composed of two fleshy lobes, crowned with oblong, broad, spotted leaves, and having upright stalks, growing to the height of twelve inches, furnished with one or two narrow leaves, and terminated by a long spike of reddish-purple flowers, which exhale a very slight agreeable odour: these commonly appear in the months of May, June, and July. The soil best adapted to its growth is dry and not very fertile: in rich or highly-manured land, it does not arrive at maturity; for where the experiment has been tried, the roots of the few plants that did appear proved black, and were half-rotted in the ground. The stem is sent up by the lobe of a former year, and the new lobe, which is therefore easily distinguishable from the old one, is formed in the course of the summer as the tubers of potatoes. The root is known to be fully matured, when the leaves and stalk begin to decay. The plants may then be dug up, and the new lobes—from which alone salep is made—separated from the others.

The process of preparing salep, according to Mr. Moult, is as follows. The roots of the orchis are gathered at the time when the seed is formed, and the stalk ready to fall; because the new bulb, of which the salep is made, is then arrived at its full maturity, and may be distinguished from the old one by a white bud arising from the top of it, which is the germ of the orchis of the succeeding year. The new root is to be washed in water, and the fine brown skin which covers it is to be separated by means of a small brush, or by dipping the root in hot water, and rubbing it with a coarse linen cloth. When a sufficient number of roots have been thus cleaned, they are to be spread on a tin plate, and placed in an oven, heated to the usual degree for baking bread, where they are to remain six or ten minutes, in which time they will have lost their milky whiteness, and acquired a transparency like horn, without any diminution of bulk. In this state they are to be removed, to dry and harden in the air, which will require several days; or by using a very gentle heat, this operation may be finished in a few hours. Mr. Moult observes that salep, thus prepared, has a quantity of thickening water, which is to that of fine flour, nearly as two and a half to one, with this difference that the jelly of salep powder is clear and transparent, whereas that of flour is turbid and white.

Salep is brought to England in oval pieces, of a yellowish white colour, somewhat clear and pellucid, very hard and almost horny, of little or no smell, and in taste something like gum tragacanth. All that is required, to adapt the salep to food, is to boil it in water to the required consistency.

Salep is said to contain a greater quantity of nutriment in a given bulk than any other vegetable substance. The powder of it has been therefore proposed to constitute part of the provisions of a ship's company at sea. The powder, and *portable soup*, or the dried gelatinous part of flesh, dissolved together in boiling water, form a rich thick jelly. Indeed it

has been asserted that an ounce of each, boiled in two quarts of water, will be sufficient subsistence for a man per day.

Dr. Percival has adduced proof that salep may be used as an economical ingredient in bread. He dissolved one ounce of the powder in boiling water, and mixed the mucilage with a sufficient quantity of flour, salt, and yeast, viz., two pounds of flour, two ounces of yeast, and eighty grains of salt. The loaf, when baked, was remarkably well fermented, and weighed three pounds two ounces.

M. Geoffroy formed an opinion that the European *orchis* would yield nearly as good salep as that of India, which he found to be correct. He chose the largest and fullest roots he could find: these he nicely skinned, taking off the whole outer rind; then throwing them into cold water he suffered them to macerate there some time: after this he slightly boiled them; and taking them out of the water, and draining them, he had them strung upon threads, to be dried in a warm and dry air. When the roots were thoroughly dried, they were very transparent, and resembled pieces of gum tragacanth, and continued dry and hard. The roots, thus prepared, may be kept long in a dry place, and will never attract humidity, or become mouldy and rotten. The root, thus prepared, may be reduced to powder, and dissolved in boiling water, in the same manner as the oriental salep, and will be nearly equal to it in every respect.

As an article both of diet and medicine, salep has been spoken of highly. The Arabian physicians prescribe it with great confidence in consumption. The Indian practitioners believe salep to be a powerful strengthener of the body, and prescribe it in conjunction with mastic and some other ingredients, in cases requiring tonics. The restorative, mucilaginous, and demulcent qualities of salep, render it, in the opinion of Dr. Percival, of considerable use in various diseases. In the sea-scurvy it assuages the acrimony of the fluids, and is easily assimilated into a mild and nutritious chyle. In diarrhœa and dysentery it is highly serviceable, as it is also in what is called the symptomatic fever.

It does not appear that salep is much employed in this country at the present day, as an article of diet, notwithstanding the favourable opinion which medical men in general express of it.

HE that hath a trade, hath an estate, and he that hath a calling, hath an office of profit and honour: but then the trade must be worked at, and the calling well followed, or neither the estate nor the office will enable us to pay our taxes.—FRANKLIN.

CHEMISTS inform us that the union of the particles of which matter is composed, is owing entirely to what, in that science, is called affinity. For instance, in dyeing, without an affinity between the substance to be dyed and the colouring material, the dye *will not take*. There is an analogy to this theory in the moral world. "Evil communications corrupt good manners." They do so, because a latent principle of evil is often drawn out by the presence of a kindred quality in another. If this be correct, the maxim is susceptible of some qualification; for where the supposed affinities are not found, there will be repulsion instead of cohesion, and the virtuous will escape contamination. It is pleasant also to reflect that this theory includes the converse maxim, viz., "that good communications purify evil manners:" and coupled with the belief that there is no nature wholly destitute of some redeeming qualities, which favourable circumstances may draw out and strengthen, hope may be entertained for all: and they who really believe in the attracting beauty, as well as in the varied and inherent excellence of the goodness they *commend*, may find great encouragement to continue *their efforts to extend* the possession of the qualities they *reverence*.

ATMOSPHERIC AIR.—THE BAROMETER.

NATURE does not, perhaps, furnish us with a more perfect instance of her economy than is to be found in the atmospheric air. This wonderful medium, which in ordinary circumstances is appreciable by none of our senses, is one of the mightiest agents in contributing to the beauty and utility of the globe, on whose surface we dwell. Yet it requires the aid of science and reflection, to be convinced that the atmosphere is everywhere present, and that its powers are so energetic. We cannot judge of its presence by sight, except when a certain amount of vapour uniformly suspended in it, affords us the view of the blue sky, or the distant blue-clad mountains. It does not appeal to our sense of smell, save when it wafts the sweet perfume from the rich lap of variegated earth. We feel it, only when it is in motion, "breathing refreshment on a fainting world." It refers in no way to our sense of taste; and we hear it only when another body, put into rapid motion, communicates motion to it also, and this again to our ear. And yet, deprived of air, no animal, no vegetable, could exist; no flame could burn; no sound could be heard; no light could be seen. Darkness would again move upon the face of the waters, as at the time before the Creator had excited into action the powers with which He had caused organic nature to be endowed.

The uses of the air in the arts of life are as numerous as these arts themselves. The air wafts our ships "from Indus to the Pole;" raises water in our pumps; gives motion to various sorts of machinery; enables us to explore the treasures of the deep in the diving-bell, or to soar above the clouds in the balloon. The clouds themselves are supported by the air,—the state of which regulates and determines what we popularly call weather. The various forms of rain, dew, mist, and snow, by which natural scene are so beautifully diversified and improved, depends upon the state of the air, and its relation with respect to heat. The great aërial ocean, therefore, is a source of importance, utility, and beauty, to all animated nature; and we are about to inquire into its properties, but chiefly with reference to an instrument by which the ebbs and floods of this ocean of air are marked. A person well acquainted with all these properties must have made no mean progress in scientific knowledge; but, generally speaking, the use of an instrument so well known, and so extensively employed, as the barometer, is too apt to engender such a degree of forgetfulness of the principles on which it is constructed, or on which it acts, that few persons are aware of the delightful fields of inquiry into which they would be led, in endeavouring to trace, and to account for, the mode of operation, and the physical laws which determine the utility of this, as well as many other mechanical contrivances, which the ingenuity of man has invented for his own service. Yet such inquiries are, perhaps, among the best modes of attaining a knowledge of the principles of science; for, so united are the sciences one with another,—so imperceptibly are the boundaries which separate them shaded off, that a thorough knowledge of the principle of construction, and of operation, of any one instrument, will lead us into more sciences than at first we should be apt to suppose.

[TOMLINSON'S *Student's Manual of Natural Philosophy.*]

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THE CARNIVAL AND HORSE-RACES, AT ROME.

THE DECORATED HORSES.

THE Carnival at Rome is in many respects a singular holiday,—singular for the splendour and the absurdity which distinguish it, and for the irrepressible eagerness with which the inhabitants join in it. A lively writer, Miss Waldie, remarks:—

The Romans, in throwing off the shackles of moral restraint, do not seem to have gained much gaiety or pleasure by their release. Nothing is more striking to a stranger than the sombre air which marks every countenance, from the lowest to the highest, in Rome. The faces even of the young are rarely lighted up with smiles; a laugh is seldom heard; and a merry countenance strikes us with amazement, from its novelty. Yet, will it be believed that this serious, this unsmiling people, rush into the sports of the carnival with a passionate eagerness far surpassing all the rest of the Italians? It seems as if some sudden delirium had seized them. All ranks, classes, ages, and sexes, under the same intoxication of spirits, parade the streets. The poor starve, work, pawn, beg, borrow, steal, —do anything, to procure a mask and a dress; and when the bell of the Capitol, after mid-day, gives licence to the reign of folly to commence, the most ridiculous figures issue forth,—wild for their favourite diversion.

The carnival at Rome lasts, in some degree or other, almost from Christmas to the commencement of Lent; but it is only during the last week of that period, that masking is allowed in the open streets. The windows and balconies are hung with rich draperies, and filled with gaily-dressed spectators; and indeed, the preparation for these festivities occasions no small amount of profit to many parties. For several days previously the shops are converted into wardrobes, whole streets are lined with masks and dominoes, the robes of sultans, and jackets of pantaloons; canopies are suspended, scaffolds are erected for the accomodation of those who have not the interest to obtain admission to the houses and palaces, along the whole line of the Corso (the principal street wherein the festivities are held); while double rows of chairs are placed along the causeway, and hired by the week, by the less opulent spectators.

On the first day of the carnival, when all the preparations are not quite completed, women are seen at their doors, making harlequins' jackets, and pantaloons' trowsers,—children are making paper masks and wooden swords, and all is bustle and anticipation, when, at the firing of a cannon, all the shops are closed, and the sports commence. All along the centre of the Corso, for more than a mile, is a line or procession of the carriages of the princes, potentates, ambassadors, &c. On each side of that central line is another line of the carriages of all the foreign nobility who may happen to be then in Rome, and who may choose to exhibit themselves on the occasion. Then come rows of cavalry, placed probably both to preserve order, and to add to the gorgeousness of the scene. Lastly there are pedestrians of every rank and age, parading up and down

in the most grotesque dresses; while the windows and balconies of the houses are crowded with spectators from the first story to the sixth.

A standard amusement on this occasion, is a battle of *sugar-plums* between the carriage people and the pedestrians, and between those within and those without the houses. Lady Morgan observes, that the white satin robe and gaudy head-dress of a lady in a carriage is exposed to the "pitiless pelting of the storm," showered indiscriminately from all the houses and by the pedestrians on the occupants of carriages, in the *form* of sugar-plums, but in the *substance* of plaster of Paris. It appears that the combatants cannot afford real comfits, and therefore make use of "confitti de' gesso," or plaster comfits. A recent tourist remarks:—

Strangers seldom attack you; but those who know you seldom let you escape; and we, being unmasked and in an open carriage, were generally most unmercifully pelted by masked antagonists. We took care to return the compliment with interest,—abundance of this material, which may be called the *wit* of the masquerade, being on sale, so that you can never be at a loss for a repartee. Sometimes, indeed, we were assailed by an unexpected volley from some passing pedestrian mask, on whom we could *at* the time, inflict no retaliation; but we never failed to mark him as a subject for future retribution, when the course of the promenade brought him again within our reach. It often happens in the many stops of the carriages, that two in the opposite lines begin the assault, and quantities of ammunition being poured in, a furious pitched battle is carried on, until the cavalcade being put in motion again, separates the combatants. We sometimes received a discharge of *real* comfits; but they came "like angels' visits, few and far between."

At the Ave Maria, or fall of day, a cannon is fired off as a signal to clear the streets and prepare for the horse-races. The carriages file off by the nearest avenues, and their occupants hasten into the houses; and in a short time, windows, balconies, chairs, scaffolds, and foot pavements, are crowded to suffocation. A temporary barrier, erected near the Porta del Popolo, is the point from which the race commences. At the discharge of a cannon this barrier is withdrawn, and the whole competitors fly off at full speed. The course, which is along the Corso, and consequently paved, is about a mile in length, and the horses are stopped by a piece of cloth which is suspended across the street, near the Venetian Palace, at the *Ripresa de' Barberi*, so called from Barbary horses having been the original racers.

The horses are small, and are of little value. They have no rider, but are placed each in a stall behind a rope, which is dropped as soon as the moment for starting arrives. A number of tin-foil and paper flags are stuck over their haunches; small pointed bodies are placed to operate as a spur; and the noise and the pain of these decorations serve to put the horse on his full speed, to which he is further urged by the shouts of the populace. Some writers have talked of the high spirit and emulation of these horses; but the truth is, that their impetuosity in the race is not so much owing to their natural spirit, as to the agony occasioned by the goads, or balls covered with sharp spikes of metal, suspended from their backs, which at every motion fall heavily on the sides of the poor animal, and wound him distressingly. Sometimes six or eight of these goads are beating in his bleeding sides at once; and as if this were not torment enough, fire is likewise applied to them; so that the poor animals, furious under these tortures, often cannot be restrained by the force of eight or ten men from leaping the cords which confine them at the entrance of the Corso. It often happens that some of the horses run aside down other streets; and on one occasion the *spectators* were *wholly* disappointed, for all the horses turned off together at a favourable avenue. The prize run for is generally a rich piece of velvet.

The carnival terminates, or is *put out*, as it is termed, on Shrove Tuesday, by a most whimsical ceremony. Immediately after the horse-race has terminated, the whole of the houses are illuminated, and all the persons, whether on foot or in carriages, hold lighted tapers in their hands, wax, if they can afford it, or else tallow. After being in this position some time, the troop of cavalry march down the Corso; and this is the signal for every one to blow out his neighbour's taper, and to keep in his own. An intelligent traveller has observed, that though the absurdity of the whole affair struck him forcibly, yet the irresistible drollery of the scene made it quite impossible to philosophize on it at the time. In a short time, all is in darkness, the troops proceed to their barracks, and the multitude proceed to their own homes, where feasting and merriment is kept up.

This ends this extraordinary festivity, one which reflects but little credit on the good sense and good feeling of those who uphold it. The buffoonery and childish amusement of the masking, and the cruelty to the horses in the races, are not the only objectionable features in the affair. The carnival is always ushered in by an *execution*, for if there are any criminals destined to condign punishment, they are reserved for this occasion. And if it is repulsive to our notions of humanity to usher in a period of extravagant hilarity and joy by the ceremony of depriving some wretched creatures of existence, it is equally repugnant to our religious feelings, that the day after these fooleries have terminated, witnesses a display of all those solemn rites which the Romish Church ordains for the first day of Lent, or Ash Wednesday. Of the rites themselves, we do not propose now to speak; we merely offer a remark, that the carnival is but a poor preparation for that state of mind consonant with the season of Lent.

SEA-KALE, OR COLE-WORT*.

SEA-KALE is a native of the south of Britain, and of some parts of Ireland. It is found wild on sandy shores, and has long been used by the poor in the neighbourhoods where it is plentiful, as a substitute for young cabbage. A very fine sort is found on the Hampshire coast, near Calshot Castle: it also grows in much abundance, and is valued as a culinary vegetable, in the neighbourhood of the Bay of Dublin. It is now eighty years since the cultivation of it in gardens began to occupy some attention, but it was not till the year 1794 that it came into high repute. It was much recommended by Dr. Curtis, who wrote a treatise on the subject, and by Dr. Lettsom, who had even at an earlier period advocated the use and cultivation of the plant; and being found an excellent substitute for forced asparagus, it began to be much esteemed and generally cultivated.

Sea-kale has been spoken of as the most wholesome of vegetables, containing all the good qualities of the cabbage tribe, and acting as a sweetener and purifier of the blood: it must, therefore, be exceedingly valuable in a country like ours, where the consumption of animal food is so enormous. The ease and certainty with which it may be raised, so as to have a supply during the winter season, is a great recommendation to this plant; and instead of being injured by forcing in hot-beds, or otherwise, the flavour is thereby much improved. The plant will grow luxuriantly in any soil, provided it be loose enough; but

* The word cole, or kale, is derived from the Anglo-Saxon *cayl* or *cayl-wort*. *Kohl*, or *kol*, is the German for cabbage.

as the mild flavour of the vegetable is destroyed by allowing it to attain to a very large size, a poor and sandy soil must be selected, and care must be taken to prevent the access of any substance which will be likely to destroy the purity and healthfulness of the plant.

Sea-kale may be propagated in three ways,—by seeds, by slips, and by pieces of the root; but the propagation by seed seems to be the most preferable method. A bed may be prepared on any open part of the garden, composed chiefly of sea or river-sand, to the depth of twelve or fifteen inches. From the middle of March to the end of April the seed may be sown, by dropping it along the middle of the bed in patches, two feet from each other, with three or four good seeds in each place. The crowns of the young plants should be kept as low and near together as possible, for the purpose of covering them with pots or otherwise, when necessary. They will want but little attention during the summer; the keeping them free from weeds and decayed leaves is sufficient. As winter approaches, a little earth or sand should be thrown over them, and through this layer of sand the young eatable shoots will protrude the following year. It will not be desirable to cut largely from the bed the second year; but if the plants are strong and healthy, a few dishes may be taken without injury. In order to obtain plants which shall last for eight or ten years, and still produce good sprouts, another bed should be prepared early in the spring of the second year, where the seedlings may be planted in ridges, and at a distance of two feet and a-half from each other. The strongest plants must be selected for this purpose, and their crowns set two inches below the surface of the bed. One of the most common modes of getting an early growth of the shoots, is to cover the crowns of the plants with some light sandy soil, and then place large garden flower-pots over them, and heap upon these, and around them, a layer of manure which has been previously prepared by frequent turnings, so that the rank steam and heat may be dissipated. The pots should be sunk a little way into the earth, and the holes stopped, so that any steam arising from the heating materials may not enter. Care should be taken not to make the heat too strong, and to this end the bed should be frequently examined, and the covering regulated according to the state of the weather. When the plants are found to have sprouts from six to eight inches long, they may be cut for use as close to the crown as possible, but without disturbing the young shoots that are round it. The crowns are then covered with earth, and the flower-pots and manure replaced: thus the plants will remain in a vigorous state of growth for six weeks from the first cutting, when they will probably have done their best, and it will become necessary gradually to remove their covering, that they may by slow degrees be accustomed to the colder air without. When the plants are entirely uncovered, two or three inches of good manure placed on the bed will strengthen them and enable them to bear forcing on the following winter.

Sea-kale may be conveniently raised in pots, either in a hot-bed, or in any warm corner of a kitchen. Good healthy roots must be selected, and covered with light earth or sand; another pot of the same size inverted over the first; and in this dark prison the shoots will grow as delicately, though not as abundantly, as in the way before described. In whatever way sea-kale is raised, it must never be allowed to come in contact with coal-ashes, or anything which will give it a disagreeable taste; and we again repeat that it is quite necessary for the preservation of purity of flavour, that the soil in which it is cultivated should be a very poor one.

It was a remark of the late Dr. Curtis, that the cottager might with trifling expense and little trouble regale himself with a dish of this wholesome vegetable, for many weeks throughout the Spring, at which time it is of the greatest efficiency, and, with the rhubarb, may save many a pound for medical attendance; besides, he can say with some degree of pleasure, "I grow my own medicine."

BOTANICAL QUESTIONS.

What is the sociable tree? and the dancing tree?
And the tree that is nearest the sea?
The most yielding tree? the busiest tree?
And the tree where ships may be?

The languishing tree? the least selfish tree?
And the tree that bears a curse?
The chronologist's tree? the fisherman's tree?
And the tree like an Irish nurse?

What's the tell-tale tree? the traitor tree?
And the tree that is warmest clad?
The layman's tree? and the housewife's tree?
And the tree that makes one sad?

What's the tree that with death will benight you?
And the tree that your wants will supply?
The tree that to travel invites you?
And the tree that forbids you to die?

What tree do the hunters resound to the skies?
What brightens your house, and your mansions sustain?
What urged the Germans in vengeance to rise,
And fight for the victim by tyranny slain?

The tree that will fight? and the tree that obeys you
And the tree that never stands still?
The tree that got up? and the tree that is lazy?
And the tree neither up nor down hill?

The tree to be kissed? the dandiest tree?
And what guides the ship to go forth?
The tree of the people? the unhealthiest tree?
And the tree whose wood faces the north?

The emulous tree? the industrious tree?
And the tree that warms mutton when cold?
The reddish-brown tree? the reddish-blue tree?
And what each must become ere 'tis old?

The tree in a bottle? and the tree in a fog?
And the tree that gives the joints pain?
The terrible tree when schoolmasters flog?
And what of mothers and child bears the name?

The treacherous tree? the contemptible tree?
And that to which wives are inclined?
The tree which causes each townsman to flee?
And what round fair ancles they bind?

The tree that's entire? and the tree that is split?
The tree half given to doctors when ill?
The tree that we offer to friends when we meet?
And the tree we may use as a quill?

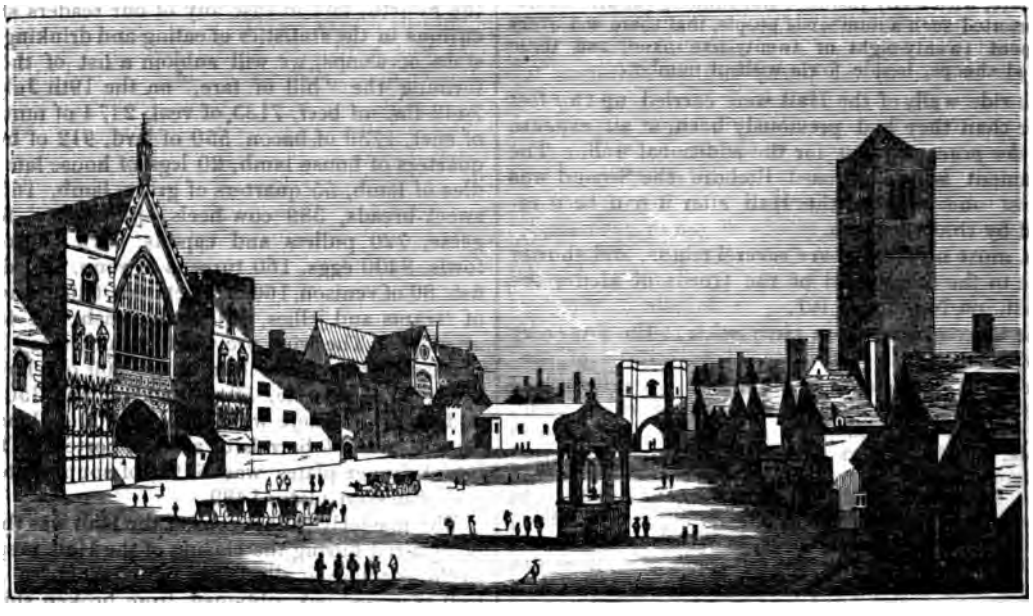
The tree that's immortal? and the trees that are not?
And the tree that must pass through the fire?
The tree that in Latin can ne'er be forgot?
And in English we all must admire?

The Egyptian Plague tree? and the tree that is dear?
And what round itself does entwine?
The tree that in billiards must always be near?
And the tree that by cockneys is made into wine?

A reserved man is in continual conflict with the social part of his nature, and even grudges himself the laugh into which he is sometimes betrayed.——Shenstone.

Gratiano speaks an infinite deal of nothing, more than any man in all Venice: his reasons are as two grains of wheat hid in two bushels of chaff; you shall seek all day ere you find them; and when you have them, they are not worth the search.——Shakspeare.

WESTMINSTER HALL, AND ITS HISTORICAL ASSOCIATIONS. No. II.



WESTMINSTER HALL IN THE TIME OF JAMES THE SECOND.

We resume our notice of this noble hall, which we have brought down to the early part of the fourteenth century.

In the year 1356 occured one of those events which are so seldom seen in modern warfare,—the capture of a king in the field of battle, and his conveyance to the land of the conqueror. In that year the battle of Poictiers in France, was fought by the English, headed by Edward the Black Prince, son of Edward the Third, and the French, under their king, John. John was taken prisoner, and brought to England; and a grand procession was made to Westminster Hall, where King Edward received his unfortunate brother monarch. A splendid cavalcade passed through Southwark, London, and Westminster, in the way to the hall, King John being clothed in royal apparel, and mounted on a cream-coloured charger, with splendid trappings; while his conqueror, Edward the Black Prince, who had many generous points in his character, rode by his side on a little black horse, simply caparisoned. At noon the cavalcade reached Westminster Hall, where King Edward was seated on his throne surrounded by his prelates and barons. When the French king entered, Edward descended from the regal seat, received his prisoner with courtesy and attention, and invited him to a magnificent banquet. King John was afterwards removed as a prisoner to the Savoy Palace in the Strand.

A curious instance of an interview between a king and his nobles took place in the hall in 1387. Richard the Second had embroiled himself with his nobles, and to settle some differences which existed between him and them, he agreed to have a conference with them in Westminster Hall. The barons

Gathered their power together, determining (at the approaching interview) to talke with the king with their armour vpon their backes, for their more suretie.

They assembled in arms, with their retainers, in Hornsey Park, avoided an ambush laid for them at the Mews near Charing Cross, (the reader will probaly suppose that Charing Cross in 1387 and 1839, presented somewhat different appearances), and entered Westminster Hall.

The King, when he heard they were come, apparelled himselfe in his kinglie robes, and with his sceptre in hand, came into the Great Hall at Westminster. The Lords, as soone as they had sight of him, made to him their humble obeisance, and went foorth till they came to the nether steps going vp to the king's seat of state, where they made their second obeisance: and then the king gave them countenance to come neerer to him, and they so did, kneeling downe before him, and forthwith he rose from his place, and lovinglie welcoming them, tooke each of them by the hand, and that doone sate him downe againe.

The particulars of the interview are of no interest to our present subject.

Westminster Hall was the scene of the very important event of the deposition of Richard the Second. We cannot enter into the political and civil discords which marked the end of his reign; it must suffice to say, that he was compelled to give in his resignation of the crown; and a parliament was held in the Hall on September 30th, 1399, for the purpose of receiving that resignation. The Hall was sumptuously fitted up, seats being provided for the prelates, the peers, and the commons,—the royal seat being left vacant. After the Archbishop of York had read the renunciation of Richard, the Archbishop of Canterbury demanded of the assembly whether they were willing to receive the renunciation. This was answered by acclamation in the affirmative. The Duke of Lancaster then rose, and stated the grounds on which he claimed a right to the throne. This claim having been admitted by the assembly, he was led to, and seated upon the throne by the two archbishops; after which the primate and the duke respectively addressed the assembly; and the duke became from that moment acknowledged as Henry the Fourth of England. Some time afterwards he was crowned, and his coronation feast held, according to custom, in the Great Hall. Parliaments were also very frequently held in the Hall about that period.

A few years before this period, the Hall appears to have undergone repair. Stowe writes:—

This great Halle was begunne to be repayred in the yeere 1397, by Richard the Second who caused the wals, windowes, and roofe to be taken downe, and new made, with a stately porch and divers lodgings of a marvailous worke, and with great costs. All which he levied of strangers banished, or flying out of their countries, who obtained licence to remaine in this land by the king's charters, which they had purchased with great summes of money: John Bottrell

being then clarke of the workes. This hall being finished in the yeere 1398, the same king kept a most royall Christmas there, with dayly justings, and runnings at tilt; whereunto resorted such a number of people, that there was every day spent twenty-eight or twenty-sixe oxen, and three hundred sheepe, beside fowle without number.

The side walls of the Hall were carried up two feet higher than they had previously been, at an expense of *twelve pence* per foot for the additional wall. The Parliament which deposed Richard the Second was the first one held in the Hall after it had been repaired by that monarch.

We must now pass over several reigns, and shortly allude to the coronation of the Queen of Henry the Seventh, on Nov. 25, 1487.

The Queen came from Greenwich to the Tower by water, where—

The King's highnes welcomed her in such manner and forme as was to all estates and others there being present, a very good sight, and right joyous and comfortable to beholde. And in diuers places of the citie were ordeynid singing children, some arrayed like angelles and others like virgins, to sing sweete songes as her Grace passed by. On the morrow the Queen came forth of Westminster Hall, from the which place to the pulpit in Westminster Church, she went upon new baye clothe; but, more pitie, there was so moche people inordinately pressing to cut the baye-clothe that the Queen went vpon, that certin persones in the presse were slain, and the order of the ladies following the Queene was broken and distrobled.

After the ceremony of the coronation in the Abbey, a grand entertainment was held in the Hall, at which the Queen presided.

We have spoken of an inundation by which Westminster Hall was flooded. There have been two or three subsequent instances of a similar annoyance. Stow tells us, "that on the 30th September, 1555, by occasion of great winde and raine that had fallen, were such fluds, that on that morning the palace at Westminster, and Westminster Hall, was overflowen with water unto the stair-foote going to the Chancerie and King's Bench, so that when the Lord Mayor of London should come to present the sherifes to the barons of the Exchequer, all Westminster Hall was full of water." Twenty-four years afterwards, there was a heavy fall of snow which covered the streets of London to the depth of between two and three feet; a few days afterwards, a thaw ensued, which, together with heavy rain, caused such high floods, that the marshes and low grounds became inundated, and the water rose so high in Westminster Hall, that fishes were found there after the waters had subsided.

The reader will understand that we have professed to give only a few of the *historical* associations connected with Westminster Hall: the *legal* associations (on account of the Hall having been for so long a period the chief seat of justice) would form a subject altogether too vast for us to enter upon here, and we must not attempt it. But we find that the historical events in which the Hall has occupied a place, diminish in number as we approach in modern times; and the reason is this, that when the sovereign ceased to reside at the Palace at Westminster, in consequence of Whitehall and other palaces being built, the Hall necessarily lost much of its importance, while some of the other parts of the Palace became appropriated as houses of legislature, &c. Stowe says, "A great part of this palace at Westminster was once agayne burnt in the yeere 1512, the fourth of Henry the Eight; since the which time it hath not been re-edified: onely the great Hall, with the offices neere adjoyning, are kept in good reparations, and serveth, as afore, for feasts at coronations, arraignments of great persons charged with treasons, keeping of the courts of justice, &c."

The last "feast at coronation" which occurred in the Hall was in the reign of his late Majesty George the Fourth; and in case any of our readers should be curious in the statistics of eating and drinking on such state occasions, we will subjoin a list of the articles forming the "bill of fare," on the 19th July, 1821. 7442 lbs. of beef, 7133 of veal, 2474 of mutton, 250 of suet, 1730 of bacon, 550 of lard, 912 of butter, 20 quarters of house lamb, 20 legs of house lamb, 5 saddles of lamb, 55 quarters of grass lamb, 166 lambs' sweet-breads, 389 cow-heels, 400 calves' feet, 160 geese, 720 pullets and capons, 1610 chickens, 520 fowls, 8400 eggs, 160 tureens of soup, 166 dishes of fish, 80 of venison, 160 of vegetables, 640 of pastry, 400 of creams and jellies, 160 of shell-fish, and 480 boats of sauce. The wine provided amounted to 100 dozen of champagne, 20 of burgundy, 200 of claret, 50 of hock, 50 of moselle, 50 of madeira, and 350 of port and sherry. There were likewise 100 gallons of iced punch, and 100 barrels of ale and porter. The number of dinner plates was 6794, of soup plates 1406, and of dessert plates 1499.

The masterly timber roof of the Hall was thoroughly repaired during the closing of the Hall, preparatory to the coronation alluded to above. Forty loads of well-seasoned oak, obtained from broken ships, were employed in renewing the decayed parts, and in perfecting the whole.

About six or eight years ago, the internal stone work was renovated. The old facings of the walls were cut away, and a six inch thick layer of new stone laid upon them. The cornice, the corbels, the armorial devices and sculptures, the great south window, the lower windows, and the niches, were all likewise renovated. The floor was lowered twelve inches, and was newly paved in an uniform manner with stones nearly two feet square.

The details into which we have entered will serve to show that there are few buildings now existing in London which are connected with so many associations of past ages as Westminster Hall.

Light passes from the sun to the earth, a space of ninety-five millions of miles, in eight minutes, and the beams of the smallest taper are visible at sea, in a dark night, for at least three miles: so that the particles of light instantaneously fill a spherical space of six miles in diameter, or 1,130,976 cubical miles.

Instances of the exquisite subtlety of nature are infinite. That so small a drop of ink in a pen should be drawn out into so many letters or lines, as we find it; that silver, gilt upon its external surface, should be drawn to such a vast length of gilded wire; that so very small a worm as that found in the skin should have a spirit, and a peculiar structure and organisation of different parts; that a little saffron should tinge a whole hogshead of water; that a little civet or musk should fill a large chamber with its odour; that such a great cloud of smoke should be raised from a little incense; that the exact differences of sounds should be every way conveyed through the air, and even through the holes and pores of wood and water, (though much weakened, indeed, in the passage,) and be reflected with great distinctness and velocity; that light and colour should so suddenly pass through such a bulk of solid matter, as glass; or of a fluid, as water; yet so as at the same time to convey a great and exquisite variety of images, even though the light suffers refraction and reflection; that the loadstone should operate through all kinds of bodies, even the most compact and solid; and what is still more wonderful, that in all these cases the action of one thing does not greatly hinder the action of another, in a neutral or indifferent medium, such as the air is. Thus cold, heat, and magnetical virtues, all pass through the air at once, without obstructing one another, as if each of them had its own separate way or passage, so as to prevent impinging against, meeting with, or obstructing one another.——Bacon.

THE ART OF JAPANNING.

II

WE will now describe the method of producing various coloured Japan grounds.

For Black.—Grind either lamp-black or ivory-black with spirits of turpentine, mix it to a proper consistence with the shell-lac varnish, and spread it on the article. Ivory-black is esteemed better than lamp-black.

For Red.—Use vermilion in the same manner, but if the tint is to be very brilliant, mix it with the mastic varnish instead of shell-lac. If the vermilion by itself be too scarlet, mix it with fine red lake, or carmine.

For Yellow.—Use king's yellow in the same manner.

For Blue.—Use bright Prussian blue, or verditer, but if the shell lac varnish be used, it considerably diminishes the brilliancy of this colour. For a bright blue therefore the mastic varnish must be used.

All other colours may be produced by proper mixtures of these, but for *Orange*, red orpiment or realgar (the red sulphuret of arsenic), is preferable to any mixtures.

A fine *Green* is produced by mixing purified verdigris with king's yellow, and sometimes it is spread over a gilded surface, which gives it a peculiarly brilliant effect.

The most difficult of all colours to produce in japan work is *White*. Shell lac varnish cannot be used for white grounds, because it has a slight tinge of yellow. When hardness is not an object of importance, the basis for a white ground may be made by dissolving gum animi in old boiling poppy or nut oil, but this is generally too soft and liable to injury, and therefore the mastic varnish described above is generally used. The best colouring matter for it is made of flake white, or white lead, well washed, ground with the sixth of its weight of starch, and dried.

A kind of marbled ground is sometimes produced by dropping small quantities of various coloured grounds on the surface of water, on which they float and spread out, often forming beautiful arborescent figures. The article is then dipped into the water, and thus the figures are transferred to it, as in making marbled paper. This mode of japanning was much practised formerly and was called *the dip*.

Another beautiful kind of variegated ground, is that which resembles tortoise-shell. It is thus produced. Mix vermilion with shell-lac varnish to the proper consistence, and lay this on the parts intended to appear like the semi-transparent parts of the tortoise-shell. Instead of shell-lac varnish, drying oil very much diluted with oil of turpentine, may be used. When this vermilion is dry, lay on a coat of a varnish prepared as follows. "Take one gallon of good linseed, and half a pound of amber; boil them together till the oil becomes very brown and thick; strain it then through a coarse cloth, and set it again to boil, in which state it must be continued till it acquire a consistence resembling that of pitch." Then temper it with oil of turpentine till it be fit for use. When this has been laid on, the work is kept for three or four weeks in a stove, exposed to a very strong heat, which makes it extremely hard, and it is then ready to receive painted or gilded figures, after which it must be again exposed for some time to a gentler heat.

The mode of laying on the other grounds described above is to give the article two thick but even coats of the coloured ground, laid on with a camel's hair brush, and dry the work thoroughly in a stove. It is then ready for the painting, which is performed in three different ways: viz., in oil, in gum water, or size, and in varnish.

The method of painting in oil is not so tedious or difficult as that in varnish, and it is more durable than water colouring. Of course only those pigments can be used which are commonly called oil colours, and they are mixed with a kind of oil called japan gold size, which is tempered to a proper consistence by being diluted with spirits of turpentine. The japan gold size is made by boiling a pound of linseed oil, and while it is boiling adding gradually four ounces of powdered gum animi, stirring till the gum is dissolved. The boiling is then continued till the whole becomes tolerably thick, when it is strained through a coarse cloth and is fit for use.

When figures of gold or silver or any other metal are required, they are drawn with this gold size, and when almost dry, the metal is applied in the form of dust, which adheres to the size very tenaciously. Sometimes an entire ground of gold is used, which has a gorgeous appearance. This is done by covering the work with a coat of japan gold size, and then covering it with gold dust; and when this is dry it is painted upon, like other grounds.

The second mode of painting japan work, namely in water colours, is the least troublesome, but is seldom employed, on account of its short durability. The colours are mixed with gum water; but a better medium is a strong solution of isinglass, mixed with honey or sugar. Sometimes the figures are embossed: and to effect this they are first covered with a body consisting of equal parts of whiting and bole armenian, tempered with gum water. This is repeatedly applied till the figures are raised to the proper height, when they are painted with water colours, mixed with isinglass and honey, as described above.

But the most durable mode of painting in japan is by mixing the colours with shell-lac varnish. This is more tedious than the other two methods, but it has the advantage, that any kind of solid pigments can be used; either water or oil colours. Before being mixed with the varnish, they are ground very fine on a stone, with oil of turpentine. This kind of painting, when properly executed, is as hard and durable as glass or enamel. Besides this mode of ornamenting japan work by painting, it is sometimes made to receive engravings on wood, copper, or steel. The engraving is generally transferred to a white or light coloured ground; and the method is something like that employed in transfering engravings to the surface of pottery or porcelain. The engraving is first printed on fine thin paper, which has been well-sized with isinglass or gum water. When this print is dry, the japan ground is covered with a thin coat of copal varnish, and the printed paper is placed on it, with the printed side downwards; and the print is thus transferred to the japan ground. The paper can afterwards be removed by wetting it with warm water, which dissolves the gum or isinglass, and sets the paper free.

Another excellent mode of printing on japan, is by using, instead of paper, a composition of treacle, glue, and whiting. This compound may be made to resemble in consistence, sheets of Indian rubber. Its flexibility and elasticity therefore enables it to be applied to curved japanned surfaces with advantage.

The last process in japanning consists in giving the finishing coats of transparent varnish or glazing, which not only beautifies the work, but also preserves it from injury. This is always done, whether the ground be left unornamented, or printed, or painted in either of the three methods described above. The

best glazing consists of common seed-lac varnish, prepared as follows. "Take three ounces of seed-lac, and wash it well in several waters; then dry it, and powder it coarsely; put it, with a pint of rectified spirit of wine, into a bottle, so that it be not more than two-thirds full; shake the mixture well together, and place the bottle in a gentle heat, till the seed appears to be dissolved, the shaking being in the mean time repeated as often as may be convenient; and then pour off all the clear, and strain the remainder through a coarse cloth." The mode of applying this is to place the japanned articles in a warm dry place, and lay on the varnish quickly but carefully with a flat camel's hair pencil. The number of coats given must be at least five or six, and the work must of course be allowed to dry between each. Where the ground consists of one uniform colour, its effect is often heightened by mixing a similar colour in the final varnish. Thus, if a vermilion ground be required to be very bright, it is glazed over with fine lake or carmine, mixed in the varnish. And for a similar reason varnish containing smalt, or Prussian blue, is used to glaze over blue grounds; and to heighten yellow grounds, the seed-lac varnish is made with spirit of wine, in which a quantity of turmeric has been dissolved and strained.

The common seed-lac varnish has a slight tinge of yellow, which renders it unfit for glazing over whites and other delicate colours, except yellows, greens, and oranges. In such cases, therefore, whiter varnishes are used, which, however, are always inferior in hardness. A very good but soft varnish of this kind is made from nut oil and gum animi, which has been already described. Another, which is more durable, but not so white, is made of three ounces of gum animi and two ounces of the whitest grains that can be picked out of seed-lac, dissolved in a quart of spirit of wine, and strained. Or seed-lac and gum animi may be mixed in various proportions, according as durability or purity of colour be required most. If the proportion of seed-lac be small in comparison with the gum animi, a little crude turpentine should be added to take off the brittleness.

In all cases, after the final varnish is quite dry, it should be polished for some time with a woollen rag, dipped in the proper polishing powder, dry. It should then be polished for a short time with the powder moistened with oil of any kind, and lastly worked with oil alone, which cleanses it from all impurities, and finishes the whole operation. The proper kind of polishing powder is the common tripoli, or pumice stone, or rotten stone, well powdered; but for whites and other delicate colours a white polishing dust must be used, such as fine putty or whiting. The layer of varnish should of course be so thick, that this polishing may not rub it off, and expose the bare surface of the ground or figures beneath. If on trial this be found to be the case, one or two additional coats of varnish must be laid on. All japanned work is greatly improved by being exposed to a strong heat for some time in a stove. This hardens the varnish.

The common black candlesticks, metal trays, &c., are by no means japanned by this long process. A much simpler method is employed, and the article neither undergoes the preparatory priming nor the finishing varnish, as the black ground has a sufficient polish without it. One mode of effecting this is simply to brush the article over with drying oil, and then to place it in a stove gently heated, and gradually and carefully to increase the heat till the oil assumes a black colour. Another kind of black japan which requires no glazing, is made by mixing japan gold size with lamp or ivory black.

To the ancients who lived in the infancy of the world, or rather in the infancy of man's experience, the question whether the laws of nature have that degree of permanence and fixity that can render them subjects of systematic discussion, or whether, on the other hand, the qualities of natural agents are subject to mutation, from lapse of time, was very rational, and hence their distinctions between corruptible and incorruptible. Thus, according to some of them, the matter only of the celestial spheres is pure, immutable, and incorruptible, while all sublunary things are in a state of lapse; the world becoming paralyzed with age, and man himself deteriorating in character, and diminishing at once in intellectual and bodily stature. But to the moderns, who have the additional experience of some thousand years, the question of permanence is in a great measure decided in the affirmative. The profound speculations of modern astronomers, grounding their conclusions on observations made at very remote periods, have proved to demonstration, that one at least of the great powers of nature, the force of gravitation, the main bond and support of the material universe, has undergone no change in intensity from a high antiquity. The stature of mankind is just what it was three thousand years ago, as the specimens of mummies which have been exhumed at various times sufficiently show. The intellect of Newton, La Place, or La Grange, may stand in fair competition with that of Archimedes, Aristotle, or Plato; and the virtues and patriotism of Washington, with the brightest examples of antiquity.—HERSCHEL.

He that finds truth, without loving her, is like a bat; which, though it have eyes, to discern that there is a sun, yet hath so evil eyes, that it cannot delight in the sun.—SIR PHILIP SIDNEY.

MECHANICAL POWERS.

V.

4. The Inclined Plane.

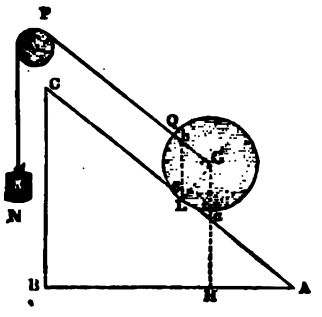
There remain three more mechanical powers, viz. the inclined plane, the wedge, and the screw. They all depend on the same principle,—that of *applying the force indirectly*, or *not in the direction of the effect that is finally to be produced*. Thus, when a mariner wishes to guide his ship towards that point from which the wind blows, instead of proceeding in a straight line, so as to have the whole force of the wind to overcome, he *tacks*, or proceeds in a zig-zag path, which, though longer, is not directly opposed to the wind, and is therefore more easily traversed. In such cases, the longer our path is, or the more indirectly we apply our force, the more easily will the resistance be overcome; and very often, a resistance which could not be overcome by meeting it directly and face to face, will be found to yield gradually and imperceptibly if we insinuate ourselves by a winding or indirect path which is not apparently intended to lead to our goal, but yet gets continually nearer to it.

Of this kind is the inclined plane, which is nothing more than a regular slope, by which heavy bodies are more easily raised than by pulling them up perpendicularly. In this case the resistance to be overcome is the force of gravity, which invariably acts directly downwards. Whenever, therefore, we raise anything, we have to overcome this force of gravity. If we raise a body perpendicularly, we act directly in opposition to gravity. But, if we raise it in a sloping direction, we likewise oppose gravity, though not directly; our path is not in a direction exactly opposite to that of gravity, but rather sideways to it; and therefore we do not feel the effect of it so sensibly; and though the plane does gradually get higher and higher, yet the gravitating force is in proportion overcome. But this increased ease of progress is made up for by the increased length of the plane; so that the same rule holds good in this as in the other

mechanical powers,—there is no real gain of power: it requires no more absolute power to walk a mile directly in opposition to the wind, than to get to the same spot by *tacking*, or to go by a longer and more winding path not directly opposed to the wind; for though easier, the path is longer, and though it requires less exertion, that exertion must be kept up for a longer period. And so with the inclined plane; it requires as much absolute power to advance a weight up an inclined plane of any length to a height of ten feet, as to pull it at once up the ten feet perpendicularly.

Nevertheless, a small weight may be made to balance a larger by means of the inclined plane; so that (in the common acceptation of the phrase) *power is gained*. To prove this, let the reader take an inclined plane of any kind, such as a writing or reading desk, or a table which has a leaf turning up on a hinge, to occupy less room. But the latter is preferable, because the degree of inclination or sloping may be altered at pleasure. A small wheel or roller will of course roll down this inclined plane; attach to the axle of the wheel or roller a string, passing over a pulley, as at P in fig. 28, and to the other end of the string attach a weight N. If this weight N be as heavy as the roller G, they will not balance each other, but N will preponderate; and it will be found that any weight at N will balance a considerably larger weight at G. The proportion between the two weights will be the same as that between the lengths of their two paths, or between C A and C B. So that if the inclined plane C A be twice as long as the perpendicular line C B, which is called the *altitude*, then the weight or power N need be only half as great as the resistance or load G. And if it be ever so little greater than this, it will raise the load G.

Fig. 28.

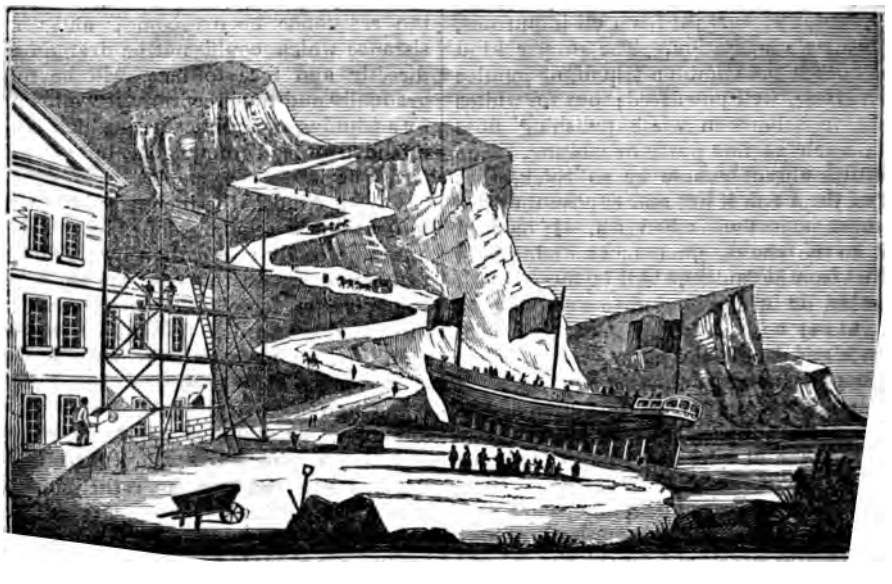


Now here, the reader will exclaim, is an exception to the law that power is never gained without losing velocity, for the velocities of the two bodies N a[illegible] are evidently equal, and yet power is gained! [illegible] true that the actual velocities of the two bo[illegible] equal, but our object is not simply to *move* th[illegible] G from A to C, but to *raise* it from the level of [illegible] the level of C. It is only its *rising progress*, the[illegible] that must be taken into account.

When the mariner in proceeding on his voy[illegible] obliged to tack, he does not measure his progr[illegible] the whole space which the ship passes over, bu[illegible] by the actual approach which he makes to the [illegible] his voyage. So we must measure the velocity [illegible] body G, not by the whole space which it *passes* [illegible] but by the space which it *rises* towards the lev[illegible] Thus we shall find that the *perpendicular velo[illegible]* the two bodies, or their *rising and sinking*, [illegible] means equal; for while the power N descends [illegible] C half way to B, the resistance G only rises [illegible] the plane A C, or to half the height that N [illegible] Thus half the velocity is lost, and therefore the [illegible] must be doubled.

Of course, the longer the plane C A is, in co[illegible] son with its altitude C B, the more will the po[illegible] increased, or the more easily will the resistan[illegible] raised. Accordingly, every one knows that the [illegible] gradual the ascent of a hill is, the more easily [illegible] ascend it; but then the easier their path is, the [illegible] and more tedious it is.

The inclined plane is, perhaps, of all the mech[illegible] powers the most useful; we use it instinctively [illegible] the lever: though we are told that Simon Ste[illegible] Bruges, first estimated its value in a scientific [illegible] of view. We may now see it used almost [illegible] raising barrels, or other heavy bodies, into ca[illegible] wagons, or out of cellars and warehouses be[illegible] level of the ground. If the bricklayer wi[illegible] wheel his materials in wheel-barrows up to [illegible] folding, he uses a plank as an inclined plane. [illegible] staircase and every hill, is an inclined plane, [illegible] difference being that the former is broken [illegible] number of horizontal surfaces, to afford a be[illegible] for the feet. In the subjoined cut, the bri[illegible] plank and ladder are instances in point. Th[illegible] ascent of the hill is an inclined plane; an [illegible] clined plane is likewise used to afford [illegible] descent in launching the ship.



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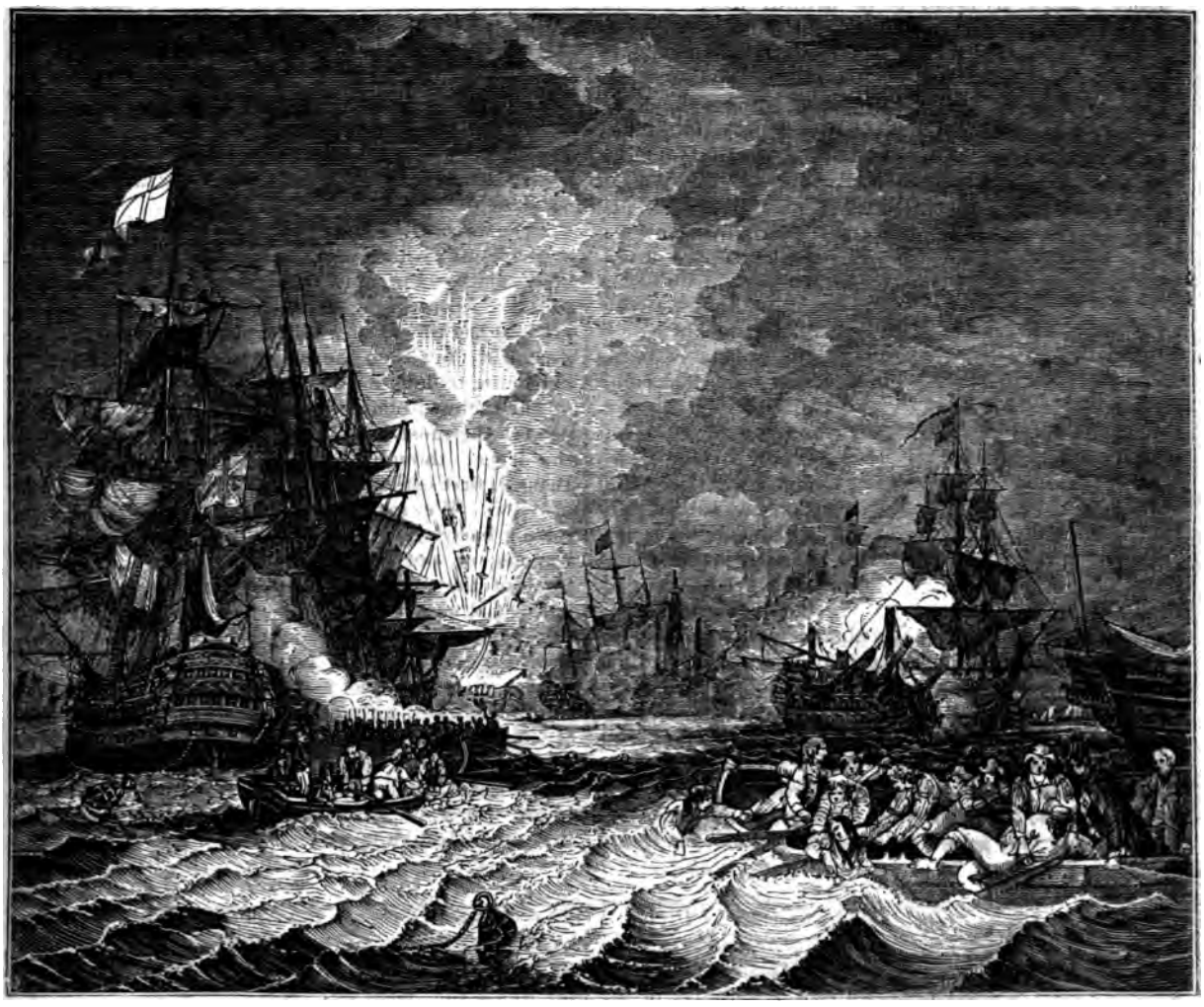
LORD NELSON, AND THE BATTLE OF THE NILE.



THE BATTLE OF THE NILE, AUGUST 1, 1798.

In the eventful wars which arose, either wholly or in part, out of the French Revolution, there were but few battles more important, either for the skill with which they were fought, or for the consequences which resulted from them, than that of the NILE. It will be desirable, in giving a brief account of this engagement, to say a few words on the relative positions of France and England at that period.

After Buonaparte had made the rapid series of conquests in Italy which distinguished the year 1797, he returned to Paris, and was received with adulation. It was probably then in his power to have assumed a lofty position in the government of France; but his insatiable ambition led him to direct an eye to a station so high, that he could see no present means of attaining it. He therefore postponed his views as to political—or perhaps we may say regal—power, and resolved to increase his already high military reputation by a bold descent upon Egypt. The objects of this expedition have been thus stated:—1st. To establish on the Nile a French colony, which, without having recourse to the system of cultivation by slaves, should supply the produce of St. Domingo and the Sugar-islands; 2nd. To open new outlets for French manufactures in Africa, Arabia, and Syria; and to obtain, in return, all the productions of these countries; 3rd. Setting out from Egypt, as a base of operations, to carry an army of fifty thousand men to the river Indus, and make common cause with the discontented among the Mahrattas, the Hindoos, and the Mussulmans against the English power in India. It is probable that an attack on the English power in India was the most powerful motive to this expedition.

Everything was prepared for the expedition, and on the 19th of May, 1798, Buonaparte sailed from Toulon with thirteen ships of the line, six frigates, and a fleet of transports, having on board 25,000 men. From Genoa and other places other squadrons joined him. He arrived at Malta on the 9th of June, and in the

short space of twelve days, conquered the island, and set sail for Egypt, where he arrived on the 5th of July. After he had landed his troops, he caused his transports to be drawn up within the inner harbour of Alexandria, while the ships of war were anchored along the shore of the Bay of Aboukir. Buonaparte then headed his army, and proceeded into the interior of the country, where we must leave him, since our attention must be directed to the fleet which he left at Aboukir.

No sooner did the English Government gain clear information of the ambitious views of Buonaparte, than they resolved to send out a fleet, in order to intercept the French squadron in its voyage from France to Egypt; and the Admiral chosen to conduct this enterprise was the gallant Nelson, of whom we have given a short biographical account *. We have now, therefore, to trace his proceedings on the present important occasion.

The British Government had not, in the first instance, a definite knowledge of the designs of the French, but hearing that an armament was collected at Toulon, they sent a fleet to watch its proceedings. This fleet was under Earl St. Vincent, and he had orders to attack the French with his whole fleet, if necessary; or if a detachment would suffice, to place it under Nelson (then Sir Horatio Nelson). Earl St. Vincent despatched Nelson from Gibraltar with three seventy-fours, the Vanguard, the Orion, and the Alexander, with four frigates, and a sloop of war. With this small fleet he sailed to the Gulf of Lyons, in order to watch the French at Toulon; and it happened that a thick mist prevented the two fleets from seeing each other, although the French, on passing out to sea, came within a few leagues of the British, who were thus fortunately saved from the attack of a vastly superior fleet.

When Nelson learned that Malta, and subsequently Egypt, was the destination of the French armament, he sent notice to Earl St. Vincent, who provided him with a large reinforcement, consisting of ten seventy-fours, the Culloden, Goliath, Minotaur, Defence, Bellerophon, Majestic, Zealous, Swiftsure, Theseus, Audacious, and the Leander of fifty guns. His fine fleet was now placed under his unlimited guidance; for his future proceedings were left wholly to his own discretion.

The first news Nelson obtained was, that the French had surprised Malta: he therefore formed a plan for attacking them in the harbour of Gozo; but they left the island before he could arrive there. He then concluded that they must have proceeded onward towards Egypt, but he was in utter want of precise information respecting their movements. He arrived with his fleet off Alexandria on the 28th of June, but the enemy were not there, neither was there any account of them; the governor had, however, received intimation of the intentions of Buonaparte, and was putting the city in a state of defence. Nelson, therefore, left Egypt, and proceeded along the eastern portion of the Mediterranean, hoping to meet the enemy.

The French fleet arrived at Alexandria, without being seen by Nelson, and the latter sailed back to Sicily, disconcerted at his want of success. At Sicily he refitted some of his ships, and sent home despatches explanatory of the unsuccessful result of his pursuit hitherto. He, however, still adhered to the opinion that the French were gone to Egypt; "but," said he, to the First Lord of the Admiralty, "be they bound to the antipodes, your lordship may rely that I will *not lose a moment* in bringing them to action."

* See *Saturday Magazine*, Vol. V., p. 157.

On the 25th of July he sailed from Sicily for the Morea; and on the 28th he gained intelligence that the French had been seen about four weeks before steering for the S. E., from Candia. Nelson immediately resolved to return to Alexandria: he reached it on the 1st of August, and there, at last, descried the French fleet. For many preceding days, Nelson had hardly taken either sleep or food: he now ordered his dinner to be served, while preparations were making for the battle; and when his officers rose from the table, and went to their separate stations, he said to them, "Before this time to-morrow I shall have gained a peerage, or Westminster Abbey."

The French Admiral had moored his ships in Aboukir Bay, the headmost vessel being almost close to a shoal, and the rest of the fleet forming a curved line along the line of deep water. The fleet consisted of thirteen ships of the line,—three of which were of eighty guns, and one of 120,—and four frigates, carrying, in all, 1196 guns, and 11,230 men. The English had likewise thirteen ships of the line, and one fifty gun ship, carrying 1012 guns, and 8068 men. Nelson's plan of attack was, to enclose a portion of the enemy's ships between a double line of his own, and thus attack them on both sides at once. When one of the officers, Captain Berry, had been informed by Nelson of the plan which he intended to pursue, he said, in a tone of delight, "If we succeed, what will the world say!" "There is no *if* in the case," replied Nelson; "that we shall succeed is certain: who may live to tell the story is a very different question." This is one of the numerous instances in which Nelson displayed a degree of confidence almost inconceivable to ordinary minds.

As the English squadron advanced, the French opened a steady fire upon them; which, however, was not returned, as the English were busily engaged in making preparations for anchoring. A French brig was used as a decoy to the English, to tempt them to approach a shoal off the island of Bequieres; but Nelson avoided the trap. Captain Foley, in the Goliath, sailed in between the French line of battle and the shore, anchored close to one of the vessels, and opened a quick fire upon it. Captain Hood, in the Zealous, in like manner attached himself to another French ship, the Guerrier, which he totally disabled in twelve minutes. Sir J. Saumarez, in the Orion, Captain Gould, in the Audacious, and Captain Millar, in the Theseus, successively passed between the shore and the French line, and singled out ships with which they engaged.

Meanwhile the remaining British ships attacked the French line on the *outside*, or the side farthest from the shore. Nelson, in the Vanguard, attacked the Spartiate, while the Minotaur, Bellerophon, Defence, and Majestic, directed their attacks against the other ships in the French line. The firing was now tremendous: it commenced at half-past six, and by seven o'clock night came on, and there was no other light than from the fire of the cannon. One of the English ships, the Culloden, was prevented from joining in the action by being suddenly grounded before it could approach the scene of contention, a circumstance not a little annoying to its commander, Captain Trowbridge. Three other English ships, the Swiftsure, the Leander, and the Alexander, escaped the accident which befel the Culloden, and joined their exertions to those of the vessels previously engaged.

Two of the French ships were taken, within a quarter of an hour, and three more by half past eight. During this interval, Nelson received a wound in the forehead, which excited great apprehension for

some time, but which was afterwards found to be slight. About nine o'clock the Orient, of 120 guns (the French Admiral's ship), took fire, and presented an awful spectacle. Admiral Brueys was killed during the action, and shortly afterwards the ship took fire, and yielded such an intense light that every ship, and almost all on the ships, became visible. At about ten o'clock the ship blew up.

This tremendous explosion (says Dr. Southey) was followed by a silence not less awful: the firing immediately ceased on both sides; and the first sound which broke the silence was the dash of her shattered masts and yards, falling into the water from the vast height to which they had been exploded. It is upon record, that a battle between two armies was once broken off by an earthquake: such an event would be felt like a miracle; but no incident in war, produced by human means, has ever equalled the sublimity of this coinstantaneous pause, and all its circumstances.

Money to the amount of 600,000*l.* was contained in the Orient. Our frontispiece represents the battle at the moment of the blowing up of the Orient.

As soon as the ship was found to be on fire, Nelson, with humanity which gives lustre to every station, gave orders that boats should be sent out for the relief of the sufferers, and about seventy French seamen were thus saved.

The battle recommenced after the explosion, and continued all night, when all the French ships but four had struck or been destroyed. These four, viz., the Guillaume Tell, the Genereux, and two frigates, contrived to make their escape. Of seventeen vessels composing the French fleet, nine were taken, three burnt, and one sunk. The English killed and wounded amounted to about 1000 men, and the French killed, wounded, and prisoners, to more than 8000. Nelson would have followed up his success by destroying the French stores on the Egyptian shore; but he had not small ships suited to that duty.

The result of this battle (called the Battle of the Nile, or sometimes, of Aboukir), brought down a shower of honours upon Nelson. The Grand Seignior gave him a pelisse of sables, worth five thousand dollars, and a diamond aigrette, valued at eighteen thousand:—the Sultan's mother sent him a box set with diamonds, valued at a thousand pounds: the Czar Paul, of Russia, sent him his portrait, set in diamonds, in a gold box,—presents similar to which he received from the Kings of Sardinia and of Naples:—at home, the King gave him a peerage: the Parliament gave a pension of 2000*l.* per annum to him and his next two successors: the East India Company presented him with 10,000*l.*: the Turkish Company gave him a piece of plate: and the City of London presented him and all his captains with elegant swords.

A recent writer has observed,—

It would be difficult to point out any naval engagement of modern times, productive of results so important as this. The military exertions of France had by degrees destroyed the combination which the princes of Europe had formed against her; the victories of Buonaparte had humbled the pride of Austria; the Continent looked with dismay towards the new republic; and when the Directory seized on Rome and Switzerland, no power ventured to interfere in their behalf. But in consequence of the victory of the Nile the aspect of affairs suddenly underwent a remarkable change, and the conqueror of Italy was shut up in a distant country, from which the fleets of England might prevent his return*."

* *Encyclo. Britannica*, "France."

The best rules to form a young man are, to talk little, to hear much, to reflect alone upon what has passed in company, to distrust one's own opinions, and value others that deserve it.—Sir William Temple.

THE RELIGIOUS LABOURS OF ARCHBISHOP CRANMER.

Among the learned men who, by their writings, their preaching, or the use of their political influence, were the instruments, under Divine Providence, through which the Reformation was effected, there was probably not one who did more towards the establishment of the Protestant Church in England, than Archbishop Cranmer.

He was born at Aslacton in Nottinghamshire, of a respectable but not wealthy family, July 2, 1489. After receiving the rudiments of education at a village school, he was removed to Jesus College, Cambridge, where he studied with great assiduity. Having married at the age of 23, he was forced to resign a fellowship which he held; but on the death of his wife shortly afterwards, he regained it. The circumstance which first brought him into notice in high quarters, was the following:—Having accepted the office of tutor to the sons of a gentleman at Waltham Abbey, he was there when Gardiner and Fox, afterwards bishops of Winchester and Hereford, happened to pay a visit at the house; and as he had a reputation for learning, his opinion was asked respecting the legality of a divorce between Henry the Eighth and Catherine of Arragon. Henry's brother, Prince Arthur, had married Catherine, daughter of Ferdinand and Isabella of Spain; but, dying soon afterwards, his widow was again married to Henry, by order of his father, Henry the Seventh; when Henry ascended the throne, he felt some religious scruples concerning his marriage with his own sister-in-law; and the point was much debated among learned men. Cranmer's answer to the question put to him was, that it would be better to appeal to the Scriptures than to the see of Rome on the subject, since "the Bishop of Rome had no authority whereby he might dispense with the word of God." This opinion came to Henry's ears, and gave great satisfaction; for the monarch appears to have had real scruples as to the marriage, and to have been strongly disposed to resist the power of the pope, although it cannot be denied that he was also influenced by less worthy motives, viz.: a growing inclination for Anne Boleyne, one of the queen's maids of honour.

Cranmer was thereupon sent for by the king, and was subsequently employed to discuss and argue the question with those who entertained an opposite opinion. In 1529 he was set to Rome, in order to obtain the consent of the pope to Henry's divorce; but all his arguments and entreaties were unavailing, and he was forced to leave Italy without attaining the object of his visit. He travelled into Germany, and shortly afterwards committed the imprudent act of marrying,—imprudent, because the laws then in force forbade a priest to marry. This act shortly caused him great perplexity; for in 1532 Henry raised him to the archbishopric of Canterbury: Cranmer dared not own that he was married, and the evasions to which he was reduced, at once injured, in some degree, his high reputation, and showed the injurious effect of the law which ordained the celibacy of the clergy.

He was now the first ecclesiastic in the kingdom; and for twenty-three years he was incessantly occupied in important affairs, most of which related to the spreading of the doctrines of the Reformation. The first act of his archiepiscopal power was to dissolve the marriage between Henry and Catherine, which there is no doubt he seriously believed to be contrary to Scripture, whatever may have been the ruling motive in Henry's mind. We must pass over many political events in which Cranmer, from his high office, was necessarily a party engaged, and proceed to speak

CRANMER PREACHING THE REFORMED DOCTRINES AT OXFORD.

of those which more immediately affected the Reformation.

Just before Cranmer's elevation, "a law was passed, which prohibited the payment of first-fruits to the pope, and decreed that any censures which might emanate from the court of Rome, on account of such prohibition, should be disregarded. In like manner, appeals to Rome, in causes of matrimony, divorces, wills, and other suits cognizable in ecclesiastical courts, were forbidden, while the oath of canonical obedience to the supreme pontiff, which the bishops had been in the habit of taking, was declared incompatible with the duty which they owed as subjects to the crown of England*." These were followed by several other statutes, all tending to lessen the influence of the pope in England; and a convocation of the clergy and the universities laid down the doctrine that "the Bishop of Rome has not any greater jurisdiction conferred on him in this realm of England, than any other foreign bishop."

Still, however, the king warred rather against the papal power than against the Romish religion, for he adhered to the purely doctrinal points of the Roman Catholic religion, such as those relating to purgatory, confession, adoration of saints, &c.; and Cranmer, who was a sincere advocate of the Reformed faith, had numerous difficulties to contend against.

In 1534, Cranmer, with the consent of the convocation, set on foot a translation of the Bible: he divided Tindal's version of the New Testament into nine or ten parts, and gave them into the hands of the most learned bishops for revision;—this work of Tindal's was the first printed edition of the New Testament in English, and had been brought out in 1526, a short time before Tindal, in conjunction with Miles Coverdale, published other portions of Scripture. Cranmer in 1534 published a book, called the "King's Primer," which is supposed to have been compiled by him; and which contained an explanation of doctrines bordering very closely on Protestantism.

There was now a proceeding entered into, respecting which there was a wide difference between the king and Cranmer, as far as regards purity of motive,—we mean the suppression of monasteries and nunneries. Cranmer urged that the proper authority of the king, as head of the English Church, and the progress of the Reformation, would be most materially interfered with by the continued existence of monastic establishments; and there can be but little doubt that such was a right view of the question. But Henry was little calculated to appreciate the *religious* motives of Cranmer: he saw that his temporal power, and his means of rewarding his favourites, would be increased by the suppression of monasteries, and he proceeded to work with an unsparing hand:—Cranmer would probably have adopted a mild and humane course;—but Henry proceeded otherwise.

Thomas Cromwell, (to use the words of Mr. Gleig,) the son of a fuller, who, after passing through the several gradations of a private trooper, a merchant's clerk, and secretary to Wolsey, had risen to the office of Secretary of State, was created Vicar General, and put at the head of a commission to inquire into the mode of life practised by the monks and nuns. The commissioners represented the religious houses as a receptacle of the grossest vices; their inmates as preying upon the credulity of the people. Immediate publicity was given to these statements, and both monks and nuns, whether justly or otherwise, became, in due time, objects of universal abhorrence. This was all that Henry desired. Proceedings were forthwith instituted against the supposed delinquents. One religious house after another was dissolved; their inhabitants were thrown loose upon the world, and their property forfeited to the crown. Thus, within the space of less than two years, six hundred and forty-five monastic establishments were overthrown, of which twenty-eight had been governed by abbots possessing seats in the upper house of parliament. Nor were colleges, chantries, free chapels, and even hospitals, spared. One common ruin overtook the whole, out of which an annual revenue, estimated at one twentieth part of the national income, was rendered available for the services of the state.

There can be no doubt that the crimes of the monastic orders were numerous, and that the frauds which they practised, in order to keep the people in ignorance and mental slavery, merited not only exposure but punishment. Probably, too, the aggregate wealth of the clergy was exorbitant; but the violence which characterised the proceedings of the reformers, their boundless rapacity, and utter disregard of the custom of ages, proved more fatal to public morals, at least for the time, than all the vices of the condemned ecclesiastics. Regardless of the entreaties of Cranmer, and the remonstrances of Latimer, Henry distributed with a profuse hand, the spoils of the church among his favourites.

Cranmer wished the revenues to be applied to the promotion of religion and education, but the king would not consent.

In 1536 Cranmer and other eminent divines compiled a book called *The Bishops' Book*, in which the

* *Rev. R. G. Gleig's Family History of England*, Vol. 1 p. 332.

principal doctrinal points of the Reformation were explained. In 1538 a deputation of German Reformers arrived in England, in order to settle some points of the Protestant religion with the English Reformers. Cranmer cordially assisted them; but the king would not go to the length they desired. In the following year, some commissioners were appointed to settle the disputed points among the Reformers; and the result was an Act of Parliament which retained so much of the Roman Catholic doctrines, and inflicted such cruel penalties on those who dissented, that Cranmer strenuously opposed it, but ineffectually, as it was supported by the king.

About the year 1542, Cranmer bent his whole attention to farther improvements in the translation of the Scriptures. He ordered the Universities to attend to the revision of a new edition of the Bible, and he also obtained the important order, that the Scriptures should be read in the English language, by the respective ministers, as a portion of the church service. In 1544 Cranmer assisted in the compilation of an English Litany, differing but little from that which is now used in our churches. Two years afterwards Cranmer drew up the form of a Communion Service, which was ordered to be used instead of mass in churches.

Henry the Eighth died in 1547, and was succeeded by Edward the Sixth, then only ten years old. At his coronation he was addressed by Cranmer in favour of the Reformation; and shortly afterwards, Homilies and translations of the Scriptures were ordered to be placed in the churches, for the instruction of the people. In 1548, twelve divines, with Cranmer at their head, composed a Church Liturgy; soon after which Cranmer procured an Act of Parliament permitting priests to marry; and other proceedings were adopted calculated to further the Reformation. About 1550, Cranmer, Ridley, Bucer, and other divines carefully examined the Church Service Book, with a view to make any alterations that might be deemed desirable; and the Common Prayer Book, nearly as we now have it, was adopted by Parliament in 1552.

But Cranmer's labours were drawing to a close. Edward the Sixth died in 1553, and was succeeded by Mary, a rigid Catholic. The consequences were soon seen: Roman Catholic bishops and priests were re-established, Protestants were expelled, and Cranmer and others were accused of heresy. In September Cranmer was committed to the Tower; and in March following he was removed to Oxford, in order that he might defend his doctrines respecting the Lord's Supper, &c. The result was that he was accused of heresy; and the pope sent a commission to try him on that charge, of which he was found guilty. His firm conscientiousness now gave way for a time: the fear of death weakened him, and he formally abjured all his opinions, and embraced the Romish faith. But this did not save him; his enemies triumphed, but still resolved to bring him to the stake. On the 20th of March, 1556, he was conducted to the scaffold, where, overcoming the weakness which induced him to renounce his religion, he said to the spectators,

Now I come to the great thing that troubleth my conscience more than any other thing that I ever said or did in my life; and that is the setting abroad of writings contrary to the truth which I thought in my heart, and writ for fear of death, and to save my life, if it might be; and that is, all such bills which I have written, or signed, with mine own hand, since my degradation, wherein I have written many things untrue. And forasmuch as my hand offended, in writing contrary to my heart, therefore my hand shall first be punished. For if I may come to the fire, it shall be first burned. And as for the pope, I refuse him, as Christ's enemy, and Antichrist, with all his false doctrine.

This address astonished his persecutors, who were not prepared for it. He, however, remained firm; and calmly held his right hand in the flame, exclaiming until he expired, "This unworthy hand! Lord Jesus receive my spirit!"

THE DROP OF WATER.

AN EASTERN APOLOGUE.

"How mean mid all this glorious space, how valueless am I!"
A little drop of water said, as, trembling in the sky,
It downward fell, in haste to meet the interminable sea,
As if the watery mass its goal and sepulchre should be.

But ere of no account within the watery mass it fell,
It found a shelter and a home, the oyster's concave shell;
And there that little drop became a hard and precious gem,
Meet ornament for royal wreath, for Persia's diadem.

Cheer up, faint heart, that hear'st the tale, and though thy lot may seem
Contemptible, yet not of it as nothing-worth esteem;
Nor fear that thou exempt from care of Providence shalt be,
An undistinguishable drop in nature's boundless sea:

The Power that called thee into life has skill to make thee live,
A place of refuge can provide, another being give;
Can clothe thy perishable form with beauty rich and rare,
And "when he makes his jewels up," grant thee a station there.

R. D. & C.

PRIDE AND CHOLER.

Pride and Choler are like the fox offering to go out when his belly was full, which enlarging him bigger than the passage, made him stay, and be taken with shame. They that would come to preferment by pride, are like those who would ascend stairs on horseback.

Other dispositions may have the benefits of a friendly monitor; but these by their vices do give a defiance to counsel. Since when men once know them, they will rather be silent, and let them rest in their folly, than by admonishing them, run into a certain brawl.

There is another thing shows them to be both base. They are both most awed by the abject passion of the mind,—fear. We dare neither be proud to one that can punish us, nor choleric to one that is above us.

Every man flies from the burning house: and one of these hath a fire in his heart, and the other discovers it in his face.

I would not live like a beast, pushed at by all the world for loftiness; nor yet like a wasp, stinging upon every touch. And this moreover shall add to my misliking them, that I hold them things accursed, for sowing of strife among them.—Feltham.

To do what we will is natural liberty. to do what we will consistently with the interests of the community to which we belong, is civil liberty; that is to say, the only liberty to be desired in a state of civil society.

I should wish to act, no doubt, in every instance as I pleased; but I reflect, that the rest also of mankind would then do the same; in which state of universal independence and self-direction, I should meet with so many checks and obstacles to my own will, from the opposition and interference of other men's, that not only my happiness but my liberty would be less than whilst the whole community were subject to the domination of equal laws.

The boasted liberty of a state of nature exists only in a state of solitude. In every kind and degree of union and intercourse with his species, it is possible that the liberty of the individual may be augmented by the very laws which restrain it; because he may gain more from the limitation of other men's freedom, than he suffers from the diminution of his own. Natural liberty is the right of common upon a waste; civil liberty is the safe, exclusive, unmolested enjoyment of a cultivated enclosure.—Paley.

The expansion of mind which rises in us at the sight of the starry sky, the cloud-capt mountain, the boundless ocean, seems intended to direct our thoughts, by an impressive though indefinite feeling, to the Infinite Author of all.—Whewell.

WHAT IS AN ALMANAC?

WHAT is an Almanac? We think we hear many of our readers say, "Everybody knows what an Almanac is!" This may perhaps be the case; but there are probably few persons who know how an almanac is computed, or why an almanac adjusted to any particular place, will not do for a place differently situated. The actual production of an almanac involves points of considerable astronomical difficulty; but there are many interesting circumstances connected with it, which admit of being popularly explained.

The word "Almanac" has given rise to much discussion among philologists, or *lovers of reading:* but it seems to imply, according to its derivation from the Arabic, the book used for *reckoning* or *counting.*

One column in an almanac is frequently the days of the year, and we number them from the 1st of January, onward to the 31st of December; so that the last mentioned day is the 365th of the year. There are not many persons now living, although there may perhaps be some, who remember when the year commenced on the 25th of March: yet such was the case: until the year 1752, the 25th of March was the first day in the year. Many inconveniences resulted from commencing the year near the end of a month, and it was resolved that from that date the year should commence on the first day of a month; the month chosen, *i. e.* January, being the nearest to mid-winter. This plan has been acted on to the present time, and will probably continue for ages to come.

But, if we look into an almanac for Leap-year,—1836 or 1840, for instance,—we find that there are 366 days in that year; so that the year is then positively longer than ordinary years. The cause of this we must explain. Until the time of Julius Cæsar, the year was almost generally reckoned to contain 365 days exactly; so that after the lapse of 365 days from the beginning of one year, the following year commenced. But this is not quite correct: a year is really equal to nearly 365¼ days. For centuries, therefore, the year has been reckoned too short; the consequence of which was, that the year was, in Julius Cæsar's time, made to begin ninety days too soon, owing to the accumulation of error. He therefore caused one of the years to consist of 444 days; which brought matters nearly to a proper situation; and to prevent the recurrence of a similar error hereafter, he ordained that the years should generally consist of 365 days each; but that every fourth year should contain 366; this amounted to the same thing as making each year equal to 365¼ days. This long year is called the intercalary, or bissextile, or leap-year; and the additional day is now interposed between the 28th of February and the 1st of March.

But a year, accurately considered, is a few minutes *less* than 365¼ days; consequently, by making the year *exactly* 365¼ days, for nearly two thousand years, a considerable error had crept in. This error amounted, in 1752, to about eleven days; so eleven days were subtracted from that year, leaving it, in length, only 354 days. In Hogarth's prints of the "Election," one of the electors has a paper with the inscription, "Give us back our eleven days!" This alludes to a popular clamour among the ignorant of that time, that the government had robbed the people of eleven days. The day after the 2nd of September was made the 14th. Since that time the length of the year has been almost exactly correct.

The column of an almanac devoted to day of the *month is in many* respects curious. The word *month is derived from* the word *moon;* and a month is *nearly* equal in length to the time that the moon takes in going through all her changes. But it is not exactly so: if we look at an almanac for the present year, we see that there is new moon on the 9th of August, on the 7th of September, on the 7th of October, on the 6th of November, and on the 6th of December; and we therefore see that the calendar month is longer than the lunar month. In the early stages of society, and in uncivilized countries at the present day, the time from new moon to new moon forms a very convenient and distinctly marked period, for the measure of long intervals. But it happens that twelve moons, or lunar months, are not quite so long as a year, and that thirteen are longer; so that in order to make the beginning of a year correspond with the beginning of a month we have to resort to artifice. A year contains eleven days over and above twelve lunations, or lunar months, so that by adding to the length of the months,—making some to contain thirty, others thirty-one days, &c., (a lunar month containing twenty-nine and a half,) we manage to make the year contain exactly twelve *calendar* months. It must be owned that this adjustment is much more clumsy than that which relates to the length of the year.

The column of days of the week relates to a division of time which has been used from the very earliest period. The earliest people on the earth's surface had a *sabbath,* or sacred day, being every seventh day, which was ordained by Divine authority to be kept holy, in commemoration of the completion of the great work of creation. The Jews, who have never ceased to exist as a people, however much they have been scattered, have maintained a classification of days into weeks down to our own time, and other nations have followed their example. Another circumstance attending the clustering of days into periods of seven each, is, that a week is very nearly one quarter of a complete lunation, so that full moon is always *about* a fortnight after new moon. As there is one day more than fifty-two weeks in a year, every year begins one day later in the week than the preceding year; and if it be leap-year, it is *two* days later.

The columns for sun-rising and sun-setting are nearly the same year after year, for any given place, but differ for different places. The reason why the sun rises on any given day, say Jan. 1st, at the same hour and minute as on the same day of the preceding year, is that, by the corrections to which we before alluded, the length of the civil year is almost exactly equal to that of the astronomical year, and the sun is situated, with respect to any given place, exactly the same at the end of the year as he was at the beginning.

If the earth did not rotate on her axis, we should see the sun gradually mounting in the heavens from December to June, and descending from June to December; but as the earth *is* rotating, the effect produced is, that the sun rises earlier and sets later every day from December to June, and rises later and sets earlier every day from June to December; thus producing all the diversity of our seasons. Thus, then, is explained the variation in the numbers expressing the rising and setting of the sun in an almanac.

But why will not a table of rising and setting do for all parts of the world: why must an Edinburgh almanac, for instance, totally differ from a London one, in the times specified? This is occasioned by difference of *latitude.* In June, the sun at Edinburgh rises to a greater height than in December, as is the case in London; but it is *always* at a less height than

at London, both in winter and summer, in consequence of Edinburgh being at a greater distance than London from the equator, where the sun is more immediately over head. This circumstance affects the time of rising and setting; so that a London almanac is totally useless with respect to the times of sun-rise and sun-set at Edinburgh.

The time of the moon's *southing* frequently occupies a column in an almanac. This expression alludes to the moment in each day when the moon is south of the observer; and it varies very rapidly from day to day: the moon souths on an average fifty minutes later each day. The cause of this is, that the moon is moving constantly *eastward*, while the earth is rotating, so that the earth has, as it were, a journey of fifty minutes before she can again catch the moon, after having performed a rotation. A table of the moon's southing for Edinburgh will not differ much from one for London, because Edinburgh is not very far from being due north of London. But if it were far to the east or west, as at Petersburgh or New York, the same table of southing would not serve, because the moon moves a good way eastward, in the interval of her southing at London, and southing at New York, &c

The rising and setting of the moon are also frequently given. These differ greatly day by day in the same almanac,—their rate of variation is not the same as for southing; and tables arranged for different places show very dissimilar results. The causes for all this are much too complicated to be popularly explained; but we may mention one or two:—the moon is constantly moving eastward in the heavens: the rapidity of her motion is continually varying: and she is not moving in the same path as the sun moves. The latitude and longitude of the observer's position, the place of the moon in her orbit, the rapidity of her motion, and other particulars, are therefore to be taken into account in computing the rising and setting of the moon; and they form altogether a difficult part of the almanac maker's duties.

The *moon's phases* are given in all almanacs; that is, the times when she is a full moon, a half moon, (twice in the month), and a new, or invisible moon. All these terms relate, not to the actual quantity of light which falls on the moon from the sun, but to the portion of the illuminated half of the moon which happens to be turned towards the earth; and therefore in every case what we call the *age* of the moon depends on the position of the earth with respect to the sun and moon.

We may here remark that the moon's influence on parts of the human body, as given in some old-fashioned almanacs, is an entire *fallacy*: it is most untrue and absurd, often indecent, and is a discredit to the age we live in.

Equation of time, as given in almanacs, is the difference between the time as indicated by a sun-dial and that indicated by a good clock. It is occasioned by the circumstance that the sun, which is the chief agent in forming measures of time, does not appear to move equally fast on all days of the year; so that an hour by a sundial, which correctly indicates the sun's motion, is sometimes longer and at other times shorter than an hour indicated by a good clock:—a clock's hours are all equal, but the sun's hours are not all equal. The equation of time shows how many minutes are to be added to or subtracted from sun-dial time, in order to obtain clock time, or *vice versâ*. The same table of equation of time will serve all over the world. This subject is referred to in an article in this work on the SUN-DIAL*.

* See *Saturday Magazine*, Vol. XIV., p. 83.

EFFECTS OF INFIDELITY ON CHARACTER AND CONDUCT.

A MOTIVE in which the reason of man shall acquiesce, enforcing the practice of virtue at all times and seasons, enters into the very essence of moral obligation—modern infidelity supplies no such motive: it is, therefore, essentially and infallibly a system of enervation, turpitude, and vice. This chasm in the construction of morals can only be supplied by the firm belief of a rewarding and avenging Deity,—who binds duty and happiness, though they may seem distant, in an indissoluble chain; without which, whatever usurps the name of virtue is not a principle, but a feeling—not a determinate rule, but a fluctuating expedient, varying with the tastes of individuals, and changing with the scenes of life.

The actions of men are oftener determined by their character than their interest: their conduct takes its colour more from their acquired tastes, inclinations, and habits, than from a deliberate regard to their greatest good. It is only on great occasions that the mind awakes to take an extended survey of her whole course, and that she suffers the dictates of reason to impress a new bias upon her movements. The actions of each day are, for the most part, links which follow each other in the chain of custom. Hence the great effort of practical wisdom is to imbue the mind with right tastes, affections, and habits, the elements of character, and masters of action. The exclusion of a Supreme Being, and of a superintending Providence, tend directly to the destruction of moral taste. It robs the universe of all finished and consummate excellence, even in idea. The admiration of perfect wisdom and goodness for which we are formed, and which kindles such unspeakable rapture in the soul, finding in the regions of scepticism nothing to which it corresponds, droops and languishes.

In a world which presents a fair spectacle of order and beauty, of a vast family, nourished and supported by an Almighty Parent; in a world which leads the devout mind, step by step, to the contemplation of the first fair and the first good, the sceptic is encompassed with nothing but obscurity, meanness, and disorder.—ROBERT HALL

A GENTLEMAN who had filled many high stations in public life, with the greatest honour to himself and advantage to the nation; once went to Sir Eardley Wilmot, in great anger at a real injury that he had received from a person high in the political world, which he was considering how to resent in the most effectual manner. After relating the particulars to Sir Eardley, he asked if he did not think it would be *manly* to resent it? "Yes," said Sir Eardley, "it would doubtless be *manly* to resent it, but it would be *godlike* to forget it." This, the gentleman declared, had such an instantaneous effect upon him, that he came away quite another man, and in a temper entirely altered from that in which he went.

As we advance from youth to middle age, a new field of action opens, and a different character is required. The flow of gay impetuous spirits begins to subside; life gradually assumes a graver cast; the mind a more sedate and thoughtful turn. The attention is now transferred from pleasure to interest; that is, to pleasure diffused over a wider extent, and measured by a larger scale. Formerly, the enjoyment of the present moment occupied the whole attention; now, no action terminates ultimately in itself, but refers to some more distant aim. Wealth and power, the instruments of lasting gratification, are now coveted more than any single pleasure; prudence and foresight lay their plan; industry carries on its patient efforts; activity pushes forward; address winds around; here, an enemy is to be overcome; there, a rival to be displaced; competition warms; and the strife of the world thickens on every side.—DR. BLAIR.

INTERMITTING SPRINGS.

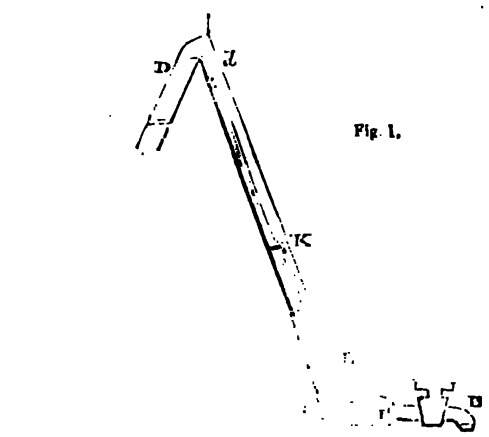


Fig. 1.

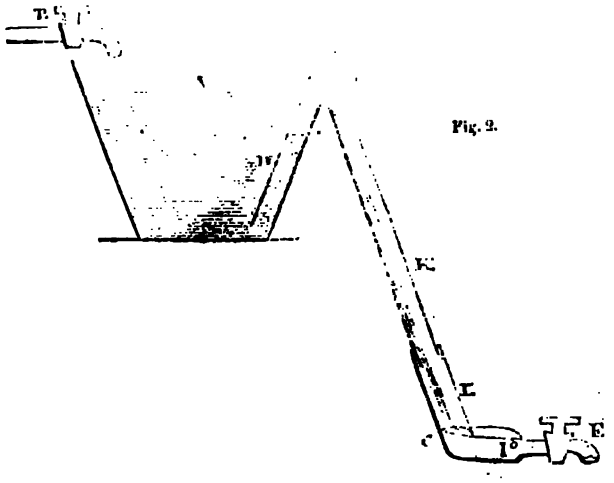


Fig. 2.

We now give, as a sequel to our former notice of this subject *, a figure and description of the model exhibited at the meeting of the British Association at Newcastle, under the hope that it may be sufficiently specific to enable any ordinary workman to construct a similar one. B is a cock for the supply of the model from some other vessel, its bore little above one quarter of an inch in diameter; A, a tin vessel or reservoir capable of holding two quarts, fixed upon a stand; D, a semi-cylindrical piece of tin, about one inch and a quarter in diameter, soldered at the top and sides to the inner side of A, to form the shorter leg of the siphon. A semicircular hole is cut through the side of A at *d*, to complete the siphon passage from the shorter to the longer leg, the semicircular side being uppermost. *d* K L is the longer leg of the siphon, extending eight or ten inches below the bottom of A, and formed of two or more pieces of tin tube, the upper piece *d* K being about three-quarters of an inch in diameter, the lower piece L being four or five inches long, and expanded in diameter, so as to allow the lower end of the piece *d* K to be fixed clear of its sides, it being necessary that any stream of water running from above may be precipitated from *d* K into the cup C, without touching the interior of the tube L. L is soldered to C, so that its lowest extremity may be barely below the level of the water, when the cup is full. E is a spout to C, furnished with a cock, and I a small hole in the side of the cup, for allowing the water to ooze from C, after each discharge from A, so that the extremity of L may become uncovered, and the atmosphere regain admission to the siphon.

* See *Saturday Magazine*, Vol. XV., p. 20.

The model being thus constructed, and supplied with water through B, shut the cock K, and the stream flowing from B, after filling A, will thicken down D K L into C, and fill it to the level of the bottom of L, from which bubbles of air, occasioned by the falling stream, will be seen escaping in increasing numbers. Now, it is obvious that these bubbles must all be abstracted from the air in the interior of the siphon, which being excluded from the atmosphere at both its extremities by the water in A and C, must therefore become rapidly rarefied, and cause the superior pressure of the atmosphere on the water in A, to force so large an additional stream up D as to fill and set the siphon in action, and thereby quickly drain the reservoir A. The discharge being over, part of the water in C will ooze away through the hole I, so as to leave the bottom of L uncovered, and admit the atmosphere (as before) to the siphon. These intermissions will recur as long as the supply is continued from B, and E closed. Should, however, E be opened, so as to prevent the accumulation of water in C, the stream will run without intermission, the bottom of L being left uncovered, and no rarefaction being produced within the siphon, so as to set it in action.

This model was constructed for the purpose of proving the curious fact that in all intermitting springs the flowing water must form *as it were* a valve to exclude the atmosphere, and then a pump to rarefy the air within the siphon, and thus to set it in action. The cup C, when filled with water, forms the valve, and the stream issuing from *d* K the pump: the exhaustion of the air being shown by the escape of the bubbles, which in natural intermitting springs must be greatly promoted by the falling water bounding against the sides of their rocky siphon channels. The exclusion of the atmosphere may, however, frequently take place at some contraction, projection, or other irregularity, in the form of the siphon channels. Thus it will be found that an intermitting fountain may be obtained in this model without the cup C, by increasing the supply of water at B, so that it may nearly occupy the whole area of *d* K, after filling A, and thus at once exclude the atmosphere, and expel the air from the siphon; or, by a less supply of water, if a slip of tin plate shall have been previously soldered air-tight into *d* K, at K, (see fig. 2) so as to oppose the descent of the falling stream, which, being dashed against this projection, chokes up the channel, and creates a water-valve at that place against the admission of the atmosphere, thereby enabling the stream (as before) *to produce the rarefaction which is essential to set the siphon in action*, but which, singularly enough, has never been noticed in the explanation of intermitting springs, hitherto universally adopted, although the inconsiderable supply of water, as compared with the cotemporaneous discharge of many of these springs, is obviously insufficient to produce that effect, unless under the circumstances above described. A model of an intermitting fountain, constructed as above, has for some time been exhibited at the Polytechnic Institution, Regent Street. W.

Except thou desire to hasten thine end, take this for a general rule, that thou never add any artificial heat to thy body by wine or spice, until thou find that time hath decayed thy natural heat, and the sooner thou beginnest to help nature, the sooner she will forsake thee, and trust altogether to art.—Sir Walter Raleigh.

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TORQUATO TASSO.

TASSO'S OAK, NEAR ROME.

The foregoing engraving represents the oak, which is popularly termed Tasso's Oak, at Rome, from the circumstance, perhaps, that the poet, in the days of his poetry, haunted its shade, or the spot on which it was planted. This is all that we can say of this celebrated tree; it not being, of course, otherwise remarkable as an individual of its species: but a view of the tree, which has been associated with the name of the great Italian poet, furnishes us with a seasonable opportunity of laying before our readers a memoir of the celebrated Tasso.

Torquato Tasso was born in the year 1544, at Sorrento, a small sea-port town on the bay of Naples. His genius was great; and genius being not unoften allied to misfortune, a large share of this earthly drug was mixed up in the cup which the poet drank of. But it is ofttimes the lot of humanity to create, or at least not to use sufficient energy to repress, the evils from which we suffer. His talents in early youth were marked for precocity, and he was designed by his father for the legal profession; so that, with a view to this, his apparent destiny, he pursued his studies at Padua, the Italian seminary of law. But, as was the case both with Ovid, sixteen centuries before, with Petrarch, and others on whom the Muses have smiled, verses would pour forth over the pages of Justinian. Ovid had already confessed—

Et quod tentabam scribere, versus erat *;

Tasso made the same confession, when, at the age of seventeen years, he published an epic poem, *Rinaldo*, in twelve cantos, dedicated to the Cardinal Ludovico

* Whatever I tried to write, was verse.

d'Este. Upon this his father released him from further pursuing his legal studies.

The chief work by which Tasso's name is now known is the *Jerusalem Delivered*, under the conduct of Godfrey of Bouillon, at the time of the Crusades. He began this in his nineteenth, and continued the work till the twenty-first year of his age, up to which time he seems to have gone on improving in mind and fortune. In the year 1565, by the wish of his patron, the cardinal, he attended the marriage of the Duke Alphonso, at Ferrara, with the Archduchess of Austria. He here saw the sisters of the duke, Lucretia and Leonora, who honoured him with their friendship and esteem. He was by them introduced to the notice of the duke, whose favour and patronage he enjoyed for some time, on the ground of his past poetical merits, and of those which his genius seemed likely to develope.

We have remarked that genius and misfortune are often yokefellows. We may still further observe that, from the flights of fancy the poet often descends into the depths of gloom: so true it is that all excitements are followed up by corresponding depressions; as if Nature had intended to establish throughout her works a system of compensation, or eventual equilibrium.

Ovid and Petrarch, the great predecessors of Tasso, seem to have fallen into a similar, but more reprehensible error than Tasso. The latter became enamoured of the duke's sister Leonora, who, it is believed, showed him such tokens of her attachment and regard, as to detain him almost entirely at Ferrara. He seems to have resided there till the publication of his *Jerusalem*, in 1575; having likewise put forth other excellent and beautiful pieces.

Without entering fully into a narration of all the movements and vicissitudes, of which he was the subject for nearly twenty years, we may briefly point attention to the sad and shocking consideration of his reputed insanity, for which he was confined for several years in a lunatic asylum. The consideration which calls our melancholy attention to this circumstance is, that the Princess Leonora has been deemed to be the secret cause of the temporary distraction to which his intellects were liable. By dwelling too long —too ardently, and too earnestly, upon this one idea of feminine worth and excellence—so far removed by fortune as to be for ever beyond his reach—he seemed to have departed from the order and habits of his fellow-creatures, and to have regarded everything through the maze of haste, irritation, and mental gloom.

The Duke Alphonso, who in the earlier part of his life had been Tasso's most partial friend and admirer, and who had even sought for immortality by identifying himself with the composition of the *Jerusalem Delivered*, was the source of Tasso's sad detention in an abode of wretchedness for seven years. How far the conduct of the duke towards Tasso affords matter for regret or censure, biographers do not seem very clear in deciding. Nor is this a thing very easy to be done, when the different passions and interests of human nature have to be weighed in the balance, and allowed for. Family pride, on the one hand, and though admiring the poet, yet contemning the mean condition of the scholar: on the other hand, a melancholy obstinacy, which knew not reason, and was at length partially, or at seasons, disowned by reason. Hence the necessity for coercing him, who was not at all times in the power of himself.

Many of his compositions, both in verse and prose, were sent out into the world during the sad years of his confinement; which consideration helps to show us not a little that, if he were subject to any mental disease, it must have referred to ONE object, as it hindered him not from pursuing, but served perhaps rather for a theme, or foundation, for the established business of his life,—poetry.

In the year 1586 he was released from confinement, and having wandered about for several years, experiencing different turns of fortune, he at length came to Rome, in the year 1594, in the month of November. He had been latterly staying some time at Naples. When he had arrived at Rome, it was decided by the Pope and his council that Tasso should be solemnly crowned with laurel in the Capitol, as had formerly been done to Petrarch; which was an august ceremony, discharged only in favour of the greatest poet of the age.

We are told that Tasso was not desirous of this honour, and that he had within himself a presentiment that it would never take place. Such is the morbid, but oftentimes not unfaithful affection of the mind, which, from whatever cause, has been sunk into the gloomy depths of despair, from want of some early wish or hope being gratified. Upon setting out for Rome, he parted with his friend Manso, and took his leave of him as with one whom he should never see again.

When Tasso arrived at Rome, he was met by many prelates, and other persons of distinction, and was afterwards introduced by the two cardinals, Cynthio and Pietro, to the presence of the Pope, who was pleased to tell him "that his merit would add as much honour to the laurel he was going to receive, as that crown had added to the honour of those on whom it had formerly been conferred." Nothing was then thought of but the approaching solemnity: orders were given to decorate not only the Pope's palace, but the Capitol, and all the principal streets through which the procession would pass. Tasso, however, appeared not to heed all these magnificent preparations; and he is even said to have uttered, in reference to them a line from Seneca, to the purport that "approaching death cuts short all praises." His melancholy forebodings were realized. While they waited for fair weather, to celebrate the ceremony, he was seized with his last illness; and although he had not completed his fifty-first year, his studies and his misfortunes had brought him to a premature old age.

Being persuaded that his end was approaching, he desired to spend a few days in the monastery of St. Onuphrius, where his father, twenty years before, had breathed his last. He was received and treated with the utmost tenderness, by the prior and brethren of that society. The physicians in Rome tried all their art, but Tasso nevertheless grew worse; and when Rinaldini, his intimate friend, and the Pope's physician, told him his last hour was at hand, he thanked him for the news, and "acknowledged the goodness of God, who was pleased at last to bring him into port, after so long a storm." From that time he disengaged his thoughts from earthly things, received the sacrament in the chapel of the society, whither he was carried by the brethren, and then brought back to his chamber. He desired to be interred in the church of St. Onuphrius. To the request that he would leave a memorial of his will in writing, and dictate the epitaph to be engraven on his tomb, he smiled and said, "In regard to the first, I have little worldly goods to leave, and as to the second, a plain stone will suffice over me." He left Cardinal Cynthio his heir, and desired his picture to be given to his friend Manso. He then received the Pope's benediction from the hand of Cynthio, an honour never so conferred but on cardinals and men of distinction. He re-

ceived it with great humility, and said, "This is the crown I came to Rome to receive." On the cardinal's desiring to know if he had any request to make, Tasso said, "He had but one favour to desire of him, which was that he would collect and commit his works to the flames," (particularly his *Jerusalem Delivered*, the most perfect.) Strange wish! but happily disregarded. In the middle of the next day, finding himself growing faint, he embraced the crucifix, held to him by his confessor, and expired before he could utter the whole of the sentence, "In manus tuas, Domine!" (Into thy hands, O Lord!) He was buried the same evening where he desired, and a plain stone was placed over his remains. When Manso came afterwards to Rome, to visit the grave of his friend, he caused the following to be engraven on the stone:—

HIC JACET TORQUATUS TASSO.

The *Jerusalem Delivered* is the work by which Tasso is best known in this country, as we have it translated by Hoole. We cannot stay to enumerate the various other works, by which his fame spread over not only his own country, but the whole of Europe; nor have we had space above to do more than merely point attention to his misfortunes, and the probable origin of them. We may, however here appropriately introduce an anecdote respecting Tasso, to show that, however unequally he was at times treated by the great and powerful, the excellence of his works had ravished the hearts of the wildest and most ferocious of mankind.

The confines of the Ecclesiastical States were formerly so infested by banditti, that travellers went in parties, for each other's protection. Tasso, having occasion to proceed from Naples to Rome, joined himself to one of these companies, and when they came within sight of Mola, a little town outside the southern part of the Pope's territory, they heard that Sciarra, a famous captain of robbers, was near at hand, with a great body of men. Tasso was of opinion that they should continue their journey, and endeavour to defend themselves; but his opinion was over-ruled, and they retired into Mola for safety. Here they remained for some time, brocked up by Sciarra. At last the outlaw, hearing that Tasso was one of the party, sent a message, assuring him that he might pass in safety, and offering to conduct him wherever he pleased to go. Tasso returned him thanks but declined the offer, not daring perhaps to rely on the word of such a man as Sciarra. The robber then sent another message, informing Tasso, that from respect to him, he would withdraw his men, and leave the way open. Sciarra did as he said; and Tasso, continuing his journey, arrived at Rome without any accident.

That Tasso had a tendency to insanity, which was perhaps aggravated by evil and mistaken treatment, the following narration will suffice to show. He fancied that he was constantly attended by a genius, with whom he held familiar converse. His friend Manso having endeavoured to reason him out of this humour, Tasso said to him, "Since you will not believe me on my word, I must convince you, by your own eyes, that what I have said is not the effect of imagination." Accordingly the next day, while they were conversing together in the same room, Manso perceived that on a sudden Tasso fixed his eyes towards the window, and stood as if he were immoveable. He called to him, and shook him several times; but, instead of giving a direct answer to his questions, Tasso said, "See, there is the spirit that has been pleased to come and visit me: look on him, and you will acknowledge the truth of what I say." Manso, somewhat surprised, directed his eyes towards the place pointed out, and saw nothing but the rays of the sun streaming through the glass; nor did he see anything at all in the room, though he looked all round him with eager curiosity. But all the time Tasso continued speaking with great vehemence, putting questions and giving answers, as if he were actually carrying on a conversation with some person in the room. Manso, in his letter to a nobleman at Naples, speaks in the most rapturous terms of this mysterious discourse, though he confesses that he never heard any other voice than Tasso's. "I am brought to that pass," says Manso, "that I know not what to think or say; only that if it be a weakness in my friend to believe these visions, I fear it will prove contagious to myself, and that I shall at last become as credulous as Tasso."

MECHANICAL POWERS.

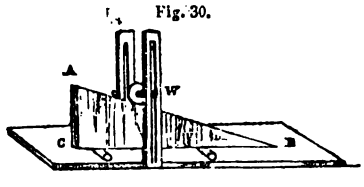
No. VI. (*Concluded.*)

THE WEDGE AND THE SCREW.

5. THE WEDGE.

WE have hitherto supposed the inclined plane to remain stationary, and the weight to be rolled up it; but it may also be used as a mechanical power by letting the inclined plane move horizontally, as in the apparatus represented in the following figure. Let w

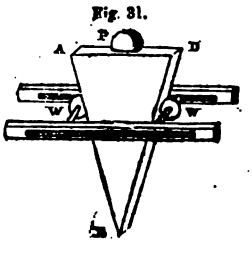
Fig. 30.



be a weight moving freely up and down between two upright guides, which keep it always in the same vertical line. Let A B C be a triangular piece of wood, whose face A B is obviously an inclined plane. If this inclined plane be pushed forward by a certain power in the direction C B, the weight w will be raised. The power at C, and the resistance at w, may also be made to balance each other; but then there will be a gain of power, because it is applied indirectly; and there is a loss of velocity because the inclined plane evidently moves forward faster than the weight w moves upwards. The gain of power is in proportion as the length C B exceeds the altitude A C; for, while the moveable inclined plane moves forward through its whole length C B, the weight only rises through its height A C. Hence, the gain is not so great as in the fixed inclined plane; for it is the line C B, and not A B, that determines the increase of power. This difference is most obvious when the planes are steep; for, with the fixed inclined plane, however steep it may be, there is always a gain of power, for A B must always exceed A C; but with the moveable plane, if C B do not exceed A C, or if the angle A B C be not less than 45°, there is no gain of power; and if A C exceed C B, or the angle A B C be more than 45°, there is even a loss.

But this is not the form in which the moveable inclined plane is commonly employed. It is usually made of iron in the shape A D B, fig. 31. Such an instrument is called a *wedge*, and is used to separate two bodies, w w, which are pressed together by a certain force which constitutes the resistance, and is overcome by a power applied at P. Here the inclined plane is *double*; and the increase of power is in proportion as P B exceeds the back of the wedge, or A D; and this agrees

Fig. 31.



perfectly with common experience, for every one knows that the sharper any cutting instrument is, the less exertion is required in using it. Now all cutting instruments act on the principle of the wedge, and sharpness consists simply in having the depth P B very great in comparison with the thickness at the back A D. The wedge is commonly used for cleaving masses of wood or stone: in this case the power applied to the back of the wedge is not *pressure*, but *impact*, or a sudden blow from a hammer; and this produces a much greater force than the mere pressure of a certain weight. In fact, the real power of the wedge can hardly be calculated; and the theories respecting it are open to question, and very much disputed.

Fig. 32.

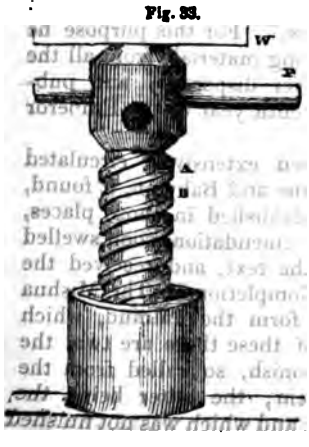
6. The Screw.

The great defect in the inclined plane, whether fixed or moveable, is its unwieldy length, where a very high power is used. To obviate this, it may be coiled up, so as to occupy a much smaller space, and it then becomes a *screw*; which may be compared to a winding staircase, which occupies much less room than a straight one of the same length and altitude; or to a winding path which begins at the foot of a steep hill, and winds round and round it till it reaches the summit. Now, of course, the longer such a path is, the more easy will it be; and to make it longer or more gentle, we must give it a greater number of turns; and, as the height remains the same, these turns will go on approaching nearer to each other.

The screw consists of a cylindrical body, having a projecting piece, called its *thread*, or *worm*, apparently wound round the cylinder in a peculiar line, called a *spiral*. To show how the spiral is produced by coiling up an inclined plane, cut out a piece of paper, in the shape of A B C, fig. 28. Apply the side B C to a cylindrical body, such as a round ruler, or a cedar pencil, and roll the paper evenly and carefully round it, and you will see that the line C A, which before represented an inclined plane, is now become a spiral line, like the thread of a screw.

Together with the screw an instrument called a *nut* is used: it consists of a block of wood or iron, having a hole in it, equal in diameter to the screw. This hole is *tapped*, or has a spiral groove cut in it, so as exactly to fit the thread of the screw. When the screw is inserted into this hole, and turned, either the screw or the nut must move; they must change their positions with respect to each other. If the nut be fixed, the screw will enter it on one side, pass through, and come out at the other side; and if the screw be fixed, the nut will be gradually worked along it from one end to the other.

Fig. 33.

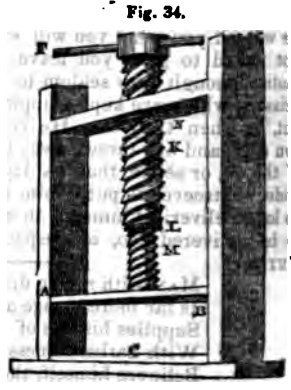


This figure represents the manner in which a screw is used to lift an enormous weight. Here the nut is fixed, as seen in the bottom of the figure: the weight W rests on the top of the screw, and the latter, by being turned round by the lever at P, is gradually raised up, lifting the weight with it. Now, first suppose the power P to be applied directly to the circumference of the screw, so as to turn it; every revolution of the power will raise the screw and weight, through the space B A, which is the distance between two turns of the thread. The loss of velocity, or the gain of power, is in proportion, therefore as the circumference of the screw exceeds the distance between two turns of the thread. Thus, if the screw were two inches in diameter, it would be about six inches in circumference; and if the distance between two contiguous turns of the thread were half an inch, the power would be multiplied twelve times. But this does not give the whole power of the machine represented above. The power is not applied directly to the circumference of the screw, but to the extremity of a long pole P, inserted into the head of the screw, and acting like a lever or winch, or like the poles of the capstan, described in our third paper. One whole revolution of this pole is necessary to raise the weight through a space equal to B A, or half an inch, in this instance. The entire power, therefore, depends on the length of the pole P, and on the closeness, fineness, and strength of the thread. If, therefore, the length of the pole be six feet, it will describe a circle whose radius is six feet, or whose circumference is about 36 feet, and all this will only raise the weight half an inch. Thus the velocity is diminished no less than 864 times, and the power increased in proportion. By means of such an apparatus as this, large buildings that have somewhat given way, are raised to the perpendicular, by the force of one or two men working at a small screw, whose head is turned like a capstan; and the first impulse which the largest vessel receives before she is launched, is from a small screw like this.

But the most common use of the screw as a mechanical power, is in the common screw-press, in which an enormous pressure is produced by a very small force. The vice, used by carpenters, is only a small screw-press, placed horizontally instead of vertically.

The following figure is a representation of the screw-press, of great value in domestic arrangements, and in other concerns of life. A screw is cut upon the *outside* of a cylinder, K L, and a corresponding *internal* screw is cut in the nut at N. The cylinder K L is also hollowed out, and an *internal* screw is cut in it, corresponding with an *external* screw cut upon the cylinder M, which is fixed to the sliding part of the press A B.

Fig. 34.



Now, if the screws K and M had the same distance between their respective threads, and the upper screw were turned round by a power P applied to the lever, the board A B would not move; for the upper screw would be depressed at N, just as much as the lower screw would be raised, within the upper one. The distance, therefore, between the threads of M is somewhat less than between those of K; so that the board A B is lowered, in each revolution of P, through a space equal to the difference of the distance between two threads in K and two threads in M.

In this machine there is an equilibrium, when the power at P is to the pressure on A B as the difference of the distances between the threads of the screws is to the circumference described by P. By increasing

the force at F, we carry down the board AB towards C. It might seem that, by lengthening the lever, and cutting the threads very fine and close, the screw would be unlimited in effect; but, in practice, the lever cannot conveniently go beyond a certain length; and, if the threads of the screw be made too fine, they become too weak to sustain the required pressure, and consequently break off.

We have thus carried the reader through a popular account of the fundamental principles of MECHANICS; which principles are the basis of all machinery. We trust that the younger student may, by means of these papers, be led to turn his attention and abilities to this universally useful department of science; and that the older workman, who may be constantly employed in practically illustrating the effects of the mechanic powers, may be disposed, upon convenient occasions, to give his mind to the principles from whence those effects result.

How much valuable and useful information of the actual existing state of arts and knowledge at any period might be transmitted to posterity in a distinct, tangible, and imperishable form, if, instead of the absurd and useless deposition of a few coins and medals under the foundations of buildings, specimens of ingenious implements, or condensed statements of scientific truths, or processes in arts and manufactures, were substituted. Will books infallibly preserve to a remote posterity all that we may desire should be hereafter known of ourselves and our discoveries, or all that posterity would wish to know? And may not a useless ceremony be thus transformed into an act of enrolment in a perpetual archive, of what we most prize, and acknowledge to be most valuable?—HERSCHEL.

A TALKER.

HIS measure of talk is till his wind is spent, and then he is not silenced, but becalmed. His ears have catched the itch of his tongue; and though he scratch them, like a beast with his hoof, he finds a pleasure in it. He shakes a man by the ear as a dog does a pig, and never loosens his hold till he has tired himself as well as his patient. He is a walking pillory, and punishes more ears than a dozen standing ones. He will hold any argument rather than his tongue, and maintain both sides at his own charge: for he will tell you what you will say, though perhaps he does not intend to give you leave. His tongue is always in motion, though very seldom to the purpose; like a barber's scissors, which are kept snipping as well when they do not cut, as when they do. He is so full of words that they run over, and are thrown away to no purpose; and so empty of things, or sense, that his dryness has made his leaks so wide, whatsoever is put in him runs out immediately. He is so long delivering himself, that those that hear him desire to be delivered too, or despatched out of their pain.—BUTLER.

MAN with raging drink inflamed,
Is far more savage and untamed;
Supplies his loss of wit and sense
With barbarousness and insolence;
Believes himself, the less he's able,
The more heroic and formidable;
Lays by his reason in his bowls,
As Turks are said to do their souls,
Until it has so often been
Shut out of its lodging, and let in,
At length it never can attain
To find the right way back again.—BUTLER.

MANY philosophers imagine that the elements themselves may be in time exhausted; that the sun, by shining long, will effuse all its light, and that, by the continuous waste of aqueous particles, the whole earth will at last become a sandy desert. I would not advise my readers to disturb themselves, by contriving how they shall live without light and water. For the days of universal thirst and perpetual darkness are at a great distance. The ocean and the sun will last our time, and we may leave posterity to shift for themselves.—JOHNSON.

THE JEWS.

I. THE TALMUD.

IN affording some information on the interesting subject of the present state and future prospects of the Jews, it will be first necessary to give some account of their book of traditions,—the Talmud; the study of which forms so essential a portion of the religious observances of the sect. We shall then make a comprehensive sketch of their condition in each quarter of the globe; and lastly, present some striking evidences of the hope by which the Hebrews seem at the present moment to be animated, of returning to the home of their fathers,—Jerusalem, and of again becoming a separate nation.

The Talmud is the book in which the traditionary laws of the Jews are recorded, as distinguished from the written law contained in the Pentateuch. The Rabbis trace for it a Divine origin; but admit that, unlike Moses, the writers by whom it was compiled were uninspired. The Jewish commentator, Maimonides, gives the following circumstantial account of its origin:

It must be known that the precepts delivered to Moses by God were accompanied by an interpretation. God himself first uttering the text, and then its explanation. When Moses returned to the tent, (compare Exodus xxxiii. 7, and xl.), the first person he met was Aaron, to whom he repeated the text and interpretation, as he had just received it. When Aaron went to stand on the right hand of Moses, Eleazar and Ithamar, his sons, came in, to whom Moses repeated what he had done to Aaron. When they went to stand, one on the left of Moses, the other on the right of Aaron, the seventy elders entered, and were taught by Moses in like manner. The whole people next came in, seeking the Lord, and the same was repeated to them, until all had heard it. Moses then left them, and Aaron repeated to those who remained, what he had thus four times heard. Aaron then departed, and Eleazar and Ithamar repeated to the elders and people what they had four times heard. On their departure, the elders repeated to the people what they had heard four times also; so that the people had heard it four times.

Thus the traditions were handed down to successive generations orally, in obedience to the strong injunction, which forbad that "things delivered by word of mouth should be committed to writing."

The misfortunes which followed, with disastrous rapidity, the rejection of the Saviour by the Jews, reached their climax by the virulent persecutions of the Emperor Hadrian, who, driving the Hebrews from Judæa, caused the beginning of that dispersion, so pointedly prophesied in Scripture, and now so visibly fulfilled; and the learned *Rabbi Jehudah* (a name all but worshipped by the Rabbinical Jews,) seeing the utter hopelessness of the Hebrew cause, collected the traditions during the succeeding reigns of Antoninus Pius, Marcus Aurelius, and Commodus, and recorded them in a book called Mishna, or "Secondary Law." For this purpose he spent many years in collecting materials from all the rabbis of the nation, wherever dispersed, and published it A.D. 140, the eleventh year of the Emperor Commodus.

The Mishna having been extensively circulated among the Jews in Palestine and Babylon, it found, in the Hebrew schools established in those places, many commentators, whose emendations soon swelled into a bulk far exceeding the text, and received the title of Gamāra, or "the Completion." The Mishna and the Gamāra united form the Talmud, which means "the Doctrine;" of these there are two, the Jerusalem and the Babylonish, so called from the schools that compiled them;—the latter being the most famous and complete, and which was not finished

till three hundred and sixty years after the first promulgation of the Mishna.

Even the ritual law of Moses abounds with the most minute ceremonies to be observed in the commonest actions of life, but these are infinitely multiplied in the Talmud; and to observe them all would be next to impossible. Indeed, it requires the study of a whole life to become acquainted, merely, with the immensity of regulations set forth in the Talmud; and many lives are devoted, among the strict Talmudists, to that sole object. "When, therefore, a boy displays a peculiarly acute mind, and studious habits, he is placed before the twelve folio volumes of the Talmud, and its legion of commentaries and epitomes, which he is made to pore over with an intenseness which engrosses his faculties entirely, and often leaves him in mind, and occasionally in body, fit for nothing else; and so vigilant and jealous a discipline is exercised, so to fence him round as to secure his being exclusively Talmudical, and destitute of every other learning and knowledge whatever, that one individual has lately met with three young men, educated as rabbis, who were born and lived to manhood in the middle of Poland, and yet knew not one word of its language*." Even before the Talmud, with its interminable commentaries, was compiled, the ritual law of the Israelites was designated as "a heavy burden, and hard to be borne;" and so minute are the observances of strict Jews to this day, that it has been remarked, it takes as hard a course of *theological* learning to become a Jew butcher, (from the vast number of regulations as to choosing the beast, sharpening the knife, &c.,) as in most universities of Europe, would qualify the student for the degree of Doctor of Divinity.

But the study of the Talmud is by no means the dry and dull occupation it might seem. The commentaries, or Gamāra, are, after the Oriental fashion, enlivened by *stories*, some of them conveying an important moral, others apparently absurd, and a few not very delicate. This method of mixing up graver matters with fanciful narratives is peculiar to the East. Mr. Lane, in his entertainng work on the *Manners and Customs of the Modern Egyptians*, states that during his residence in Cairo, he heard several songs, the alternate verses of which were the reverse of moral, while the other stanzas contained sentiments of the purest piety.

This peculiarity has frequently drawn down upon the Talmud the heaviest censure and ridicule from critics, who have kept the fanciful mode of conveying instruction adopted by Orientals out of sight; and who have forgotten that the example of our Saviour sanctified the principle of applying stories or parables to the elucidation of affairs of the most sacred importance.

Some of these Talmudic tales have been rendered into English; three of them will be found in Mr. Coleridge's work, entitled *The Friend*; and Mr. Hurwitz recently published a small volume of *Hebrew Tales* taken from the same source. We here present our readers with a specimen from the last named work:—

Compelled by violent persecution to quit his native land, *Rabbi Akiba*† wandered over barren wastes and dreary deserts. His whole equipage consisted of a lamp, which he used to light at night, in order to study the Law; a cock, which served him instead of a watch, to announce to him the rising dawn; and an ass, on which he rode.

The sun was gradually sinking beneath the horizon, night was fast approaching, and the poor wanderer knew not where to shelter his head, or where to rest his weary limbs. Fatigued, and almost exhausted, he came at last near a village. He was glad to find it inhabited, thinking where human beings dwelt, there dwelt also humanity and compassion; but he was mistaken. He asked for a night's lodging,—it was refused. Not one of the inhospitable inhabitants would accommodate him. He was therefore obliged to seek shelter in a neighbouring wood. "It is hard, very hard," said he, "not to find a hospitable roof to protect me against the inclemency of the weather: *but God is just, and whatever He does is for the best.*" He seated himself beneath a tree, lighted his lamp, and began to read the *Law*. He had scarcely read a chapter when a violent storm extinguished his light. "What?" exclaimed he, "must I not be permitted even to pursue my favourite study! *But God is just, and whatever He does is for the best.*"

He stretched himself upon the bare earth, willing, if possible, to have a few hours' sleep. He had hardly closed his eyes, when a fierce wolf came and killed the cock. "What new misfortune is this?" ejaculated the astonished Akiba. "My vigilant companion is gone! who then will henceforth awaken me to study the Law? *But God is just; He knows best what is good for us poor mortals.*" Scarcely had he finished the sentence, when a terrible lion came and devoured the ass. "What is to be done now?" exclaimed the lonely wanderer; "my lamp and my cock are gone, my poor ass, too, is gone, all is gone! But *praised be the Lord, whatever He does is for the best.*" He passed a sleepless night, and early in the morning went to the village to see whether he could procure a horse, or any other beast of burden to enable him to pursue his journey. But what was his surprise not to find a single individual alive!

It appears that a band of robbers had entered the village during the night, killed its inhabitants, and plundered their houses. As soon as Akiba had sufficiently recovered from the amazement into which this wonderful occurrence had thrown him, he lifted up his voice, and exclaimed, "Thou great God, the God of Abraham, Isaac, and Jacob, now I know by experience that poor mortal men are short-sighted and blind; often considering as evils what is intended for their preservation; but Thou alone art kind, just, and merciful. Had not the hard-hearted people driven me by their inhospitality from the village, I should assuredly have shared their fate. Had not the wind extinguished my lamp, the robbers would have been drawn to the spot, and have murdered me. I perceive also that it was thy mercy which deprived me of my two companions, that they might not by their noise give notice to the banditti where I was. Praised be Thy name for ever and ever!"

The Talmud, an object of excessive veneration among the stricter classes of Jews, was the subject of as violent persecution, hatred, and contempt, by the early Christians. The several Popes, up to the time of Pius the Fifth, in 1559, caused the books to be hunted out and burned; but the latter pontiff it was who ordered their most extensive destruction. A general burning took place through the Italian cities, and no fewer than 12,000 copies of the Talmud, in all 144,000 volumes, were destroyed. A few, however, having been successfully secreted, others were again printed from them; and, in later times, Poland became the seat of rabbinical learning, from whence it was spread over Germany, and the north of Europe.

The rabbis of the present day still remain bigoted adorers of the many absurdities contained in their book of tradition; though the light of Christianity having broken in upon many of them, has happily reduced the number of Jews who place implicit reliance upon the ordinances of the Talmud.

* *Quarterly Review*, vol. 38, p. 122. Art.: "On the present state of the Jews."

† We may mention that Akiba is a great name in Jewish history. He was the most learned of the rabbis, and president of the schools in the time of Hadrian; though he proclaimed the impostor Barchocheba (a Jewish general who led the rebellion against the Roman power) as the true Messiah, and acted as his armour-bearer. At the defeat of his countryman Akiba was cruelly carded (scratched with an *iron wool-comb) to death*, but bore the horrible tortures with extraordinary fortitude, and showed himself so attentive to the traditionary ceremonies afterwards recorded in the Talmud, as to repeat the proper prayers in the regular manner while under the hands of the executioner. His biographers have noted the very letter at which he was stopped by death. On the same day Akiba expired, the Rabbi Jehudah, who collected the Mishna, was born.

ST. HELENA.

WHILE there are some countries or districts which attract our attention by the natural peculiarities,—whether beautiful or otherwise,—which they present, there are others which derive all that renders them remarkable from the historical events with which they are connected. It happens that the Island of St. Helena combines both these attractions within itself; for while the natural features of the island are such as deserve the attention of all lovers of nature, the island is at the same time made a link in a great chain of historical events, by having been the last earthly resting-place of Napoleon Buonaparte,—the closing scene of his ambition,—his talents,—and his crimes.

St. Helena is situated in the Atlantic Ocean, in 5° 43′ West long., and 15° 55′ S. lat.: it is about twelve hundred miles distant from the west coast of Africa, and eighteen hundred from the east coast of America. Its greatest length is not more than ten miles and a half, breadth six and three quarters, and circumference twenty-eight. The whole area of the island contains about 30,000 acres, of which 14,000 are bare rock, or otherwise unimprovable, 2000 are waste lands, fit for trees or pasture, and only 3000 are considered fit for the plough. The island may be deemed to consist of one huge rock rising out of the bosom of the ocean, for it is bounded on nearly all sides by cliffs from six to twelve hundred feet in height. There is a chain of mountains running across the island from east to west, which is terminated at its eastern extremity by the Peak of Diana, rising to a height of 2700 feet. There are only four coves or openings at the shore; but rocks and shoals so abound, that there is only one of them at which a safe landing can be made, and it is at that spot where the only town on the island,—JAMES TOWN,—is situated; this is on the north-west side of the island.

The landing-place at James Town is like a half-moon, scarcely 500 paces wide between the two points; and close by the sea-side are strong batteries extending from one end of the bay to the other. The town is entered by an arched gateway, within which is a handsome parade about one hundred feet square: the road from the landing-place to this gateway passes over a drawbridge between double rows of guns. In the parade are situated the Government-house and the main-guard-room: within the former is the residence of the governor and the principal officers. The principal street in the town contains about thirty houses, most of which are neat and well built. There is also a church. The lofty headlands which command James Town, viz.: *Rupert's Hill* on the east, and *Ladder Hill* on the west, as well as every accessible portion of the coast, are strongly fortified.

There are some symptoms that the island is of volcanic origin, both from the nature of its mineral productions, and from the circumstance that slight shocks of earthquakes were felt in 1756, in 1782, and again in 1817. During a search for limestone, some years ago, a mineral was found which appeared to resemble gold-ore, and a reward of 250*l.* was offered for the discovery of a gold mine; but it was found that the mineral was *not* gold ore, nor have any symptoms of gold been since seen.

The principal animals on the island are cattle and goats, which were brought from England: pheasants and partridges are also very plentiful. There are scorpions and centipedes found in the valleys, but their sting is not dangerous. Sea-fowl, whales, and turtles occasionally appear on the coast; and there are about eighty species of fish found on the coast. It is remarkable, that although bees have frequently been brought to the island, they have never flourished: it is believed that the high winds blow them away.

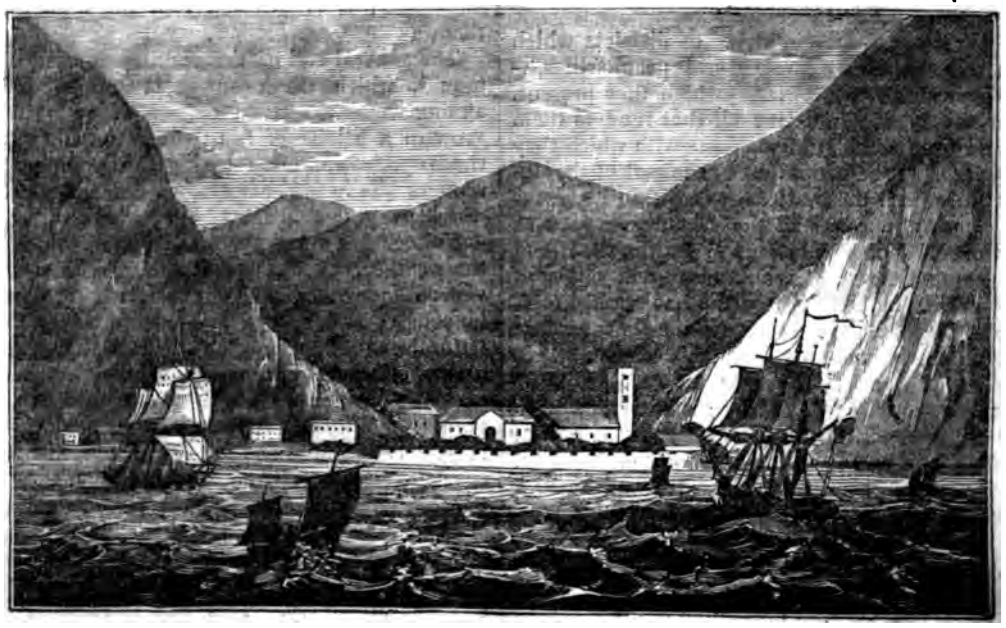
The general soil of the country consists of a rich mould, which fosters a great number of plants, among which are three species of gum-trees, which grow to a height of from three to thirty feet. All these species contain a highly aromatic gum, which renders the wood extremely pleasant as fuel, for which purpose it is chiefly cultivated; although it is not altogether unfit for building, if protected from the weather. From one of the species a sweet-flavoured liquor, called by the natives *toddy*, issues spontaneously; and a bottle, so placed as to catch the natural exudation, may be filled in the course of a night. Oaks, cypress, ferns, myrtles, and other plants, flourish in considerable abundance. Fruits are particularly abundant, as it is stated that on almost every farm are to be found vines, figs, limes, oranges, lemons, citrons, guavas, bananas, peaches, quinces, pomegranates, tamarinds, mulberries, melons, and pumpkins. Many of our English fruits have been introduced, and have not succeeded; but there is a remarkable exception to this with respect to the common *blackberry*. This was introduced in 1780, and it found the soil and climate so congenial, that it completely overspread large tracts of ground; and, as the only remedy against its encroachments, a public order was issued, and has uniformly been in force, for its entire extirpation.

The approach to the country, from James Town, has been thus described:—

> The town contains many little gardens, groves, and shady walks, and extends the whole length of the valley, which gradually decreases in breadth, till at last there is room only for a single house. The view on each side from the streets, is awfully sublime, and discovers enormous masses of rock impending over the valley in a manner sufficiently alarming to the mind of a stranger. The roads which give access to the interior of the island, and which have been formed with incredible labour, by blowing up the rocks, are carried along the sides of Rupert's and Ladder Hill in a zig-zag direction, and the ascent to the summit is so easy, that oxen and carts pass along the apparently perpendicular precipice, without difficulty or danger. For the space of two miles, nothing but naked sterility and a rocky wilderness meets the eye of the traveller; but the sight is soon gratified by the sudden prospect of woody heights, verdant lawns, cultivated plantations, and handsome little country seats. The summit of High Knoll, particularly, presents a beautiful series of such prospects, surrounded by a lofty ridge of hills and precipices, which completely close in the view, and finely contrast with the softer and richer scenes which they disclose. On the south side of the knoll, about three miles from the town, is the governor's country residence, called Plantation House, a handsome and well-built edifice.

St. Helena is a very healthy spot: the temperature in the open country is never so hot as an English summer, nor so cold as an English winter: there have been years in which the highest summer temperature was 72°, and the general temperature of winter 55°. The atmosphere is generally so clear that a ship may may be descried at a distance of sixty miles.

We must now say a few words respecting the history of the island. John de Nova, a Portuguese commander, discovered St. Helena on St. Helen's day, May 21st, 1501. There were no human beings on the island, and he merely announced the discovery, without founding a colony. About twelve years afterwards, some Portuguese noblemen, having offended against the Portuguese authorities in India, were cruelly mutilated by having their noses, ears, and right hands cut off, and in this pitiable state they were sent back to Europe. One of them, Fernandez Lopez, unable to bear the idea of appearing in his native country in such a state, was, at his own request, landed



VIEW OF ST. HELENA.

with a few slaves, on the lonely island of St. Helena. His countrymen endeavoured to alleviate his condition, by supplying him with goats, hogs, poultry, partridges, pheasants, guinea-fowls; as well as figs, oranges, lemons, peach trees, and vegetables, for planting. These succeeded so well, that in four years the little island began to have a cheerful appearance.

The government now began to perceive that the island might make a valuable halting-place for ships going from Portugal to India; by which they might have a supply of water and fresh provisions, &c: they therefore dismissed Lopez, and made the island a government station. They succeeded in concealing the situation of St. Helena from other countries for many years; but in 1588 Cavendish visited it in his return from his voyage round the world. It was soon after visited by the Spaniards and the Dutch, who wantonly destroyed the produce of the island. As the Portuguese gradually acquired settlements on the western coast of Africa, they left St. Helena in a desolate condition.

In 1651 the English East India Company formed a settlement on the island, which was confirmed to them ten years afterwards by a charter from Charles the Second. Many settlers were induced, by the offer of lands, to emigrate thither from England; and slaves were imported from Madagascar to work in the plantations. About fourteen years afterwards, the Dutch attacked and took the island; but were obliged to restore it shortly afterwards; and in the following year, 1666, many of the families which had been ruined by the fire of London, took refuge at St. Helena. Once again was it taken by the Dutch, and once again re-taken by the English.

The moral and internal economy of the island was in a very depressed state until about the year 1700, when several judicious means were resorted to for improving the morality of the inhabitants; and since that period the exertions of the successive governors have been directed to the improvement of the place. Repeated charters from the Crown vested the island to the East India Company, who govern it by a governor and council.

The importation of slaves into St. Helena ceased in 1792, and by the year 1810, it was thought necessary to import 50 Chinese labourers in order to proceed with the agricultural operations. This number was gradually increased, and in 1823 the population was divided as follows:—white inhabitants 1201, civil and military establishment 911, slaves 1074, free blacks 729, Chinese 442, Lascars 24; making in all, 4381.

In 1815 St. Helena became the scene of much interest, from having been selected as the asylum or prison of Napoleon. Early in the year he had escaped from Elba, and it was therefore deemed necessary, after the battle of Waterloo, to select a strongly fortified place as his future residence. On the 7th of August, Napoleon was placed on board of the Northumberland, which then sailed for St. Helena, where it arrived on the 16th of October. The Allied Powers had given the custody of Bonaparte's person to England, and in July, 1816, Sir Hudson Lowe arrived at the island in the capacity of governor. Buonaparte was dissatisfied with the first residence allotted to him; and a house was afterwards built for him on the highest plain on the island, 1760 feet above the level of the sea: this was called *Longwood*. Here he lived until the 5th of May, 1821, when he died of an ulcer in the stomach, the effect of which was heightened by the irritation and dissatisfaction which constantly preyed upon his mind during the last three years he remained on the island. His remains were interred with military honours in Slane's valley, near a fountain overhung with weeping willows. The grave was afterwards enclosed by a railing, and a sentry has been since appointed to guard the spot.

EPITAPH ON A MISER.

HERE lies one who lived unloved and died unlamented: who denied plenty to himself, assistance to his friends, and relief to the poor; who starved his family, oppressed his neighbours, and plagued himself to gain what he could not enjoy; at last Death, more merciful to him than he was to himself, released him from care and his family from want; and here he lies with the muck-worm he imitated, and with the dirt he loved, in fear of a resurrection, lest his heirs should have spent the money he left behind; having laid up no treasure where moth and rust do not corrupt, nor thieves break through and steal.

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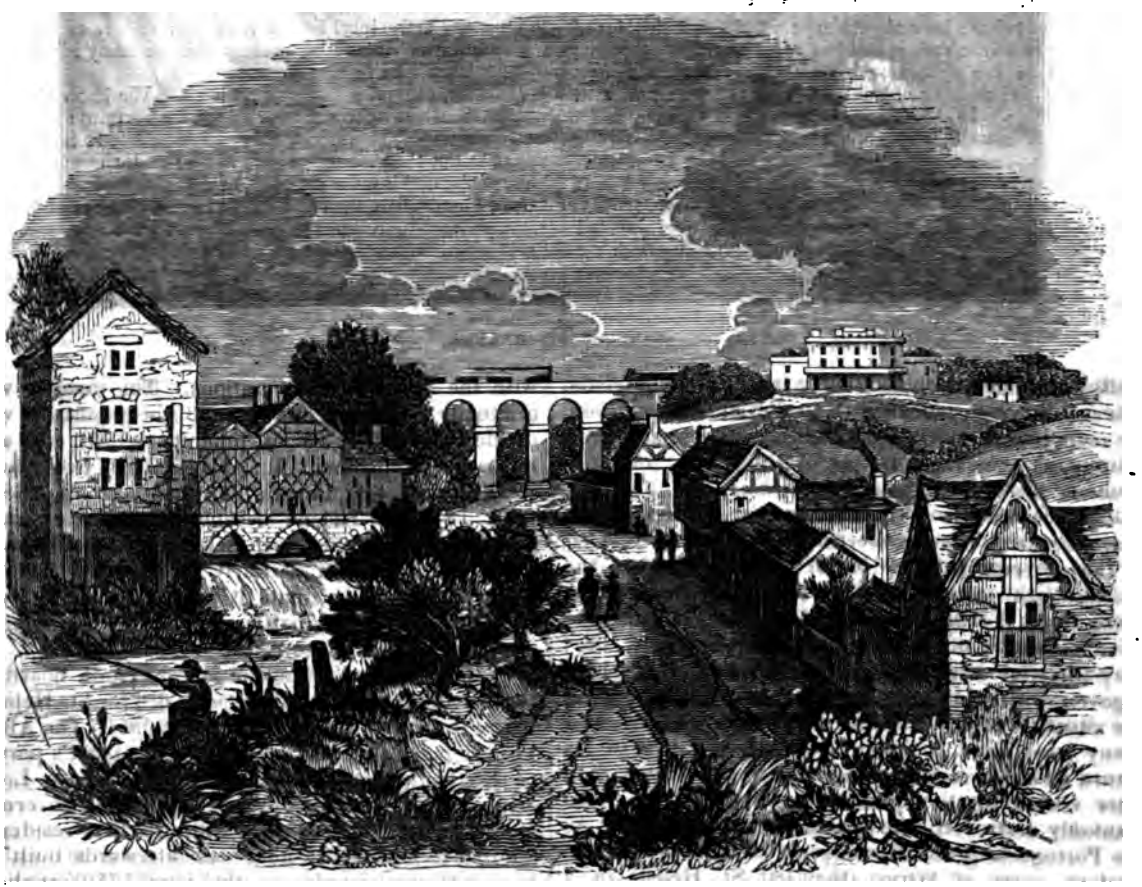
GLANCES AT RAILROAD TRAVELLING. No. I.



VILLAGE OF NEWTON, AND THE MANCHESTER AND LIVERPOOL RAILWAY.

In a recent Supplement, we presented the reader with a slight sketch of the principal modes of land travelling in England,—with one exception: an exception so important, and of such vast extent, that we could not think ourselves justified in devoting anything short of two or three complete Supplements for its consideration:—we allude to *Railroad Travelling*. We propose, therefore, to give a rapid view of the origin and progress of the railway system; and to conclude with an account of some of the most important railways now in action or in progress; as well in our own country as in other parts of the world.

When we hear the statement of a fact, which, if uttered ten years ago, would almost have been scouted as an untruth and an absurdity, that five and a half millions of pounds sterling will be the ultimate cost of the London and Birmingham Railway, we are at once tempted to ask, "What is the proposed advantage which renders such an outlay prudent?" We shall find that, whatever other advantages are gained, *diminution of friction* is the first and most prominent. The common roads are covered with gravel, broken stones, and other materials, which impede the motion of carriages to an extent which common observers are but little aware of, but which carriers, coach-proprietors, and other persons engaged in the conveyance of goods, have long known: and means have been from time to time devised for gradually improving the foundation on which the wheels press: the improvement consists mainly in making the roads *harder* and *smoother*.

It is to the collieries that we must look for the first introduction of railways, or bars of iron laid down in two parallel lines, for the reception of the wheels. The cost of conveying coals from the Newcastle pits to the sea was formerly very serious, because they were brought in small wagons on the common roads. But we find that so early as 1676, ingenuity had devised a means of saving expense in this respect, for in the *Life of the Lord Keeper North* we are told, "The manner of the carriage is by laying rails of timber from the colliery to the river, exactly straight and parallel; and bulky carts are made, with four rollers fitting those rails, whereby the carriage is so easy, that one horse will draw down four or five chaldrons of coals, and is an immense benefit to the coal-merchants." It is most probable that these wooden rails were simply attached to transverse pieces laid across the road. These wooden railways were thus described in 1765: "When the road has been traced, at six feet in breadth, and where the declivities are fixed, an excavation is made of the breadth of the said road, more or less deep, according as the levelling of the ground requires. There are afterwards arranged, along the whole breadth of this excavation, pieces of oak wood of the thickness of four, five, six, and even eight inches square: these are placed across, and at the distance of two or three feet from each other; these pieces need only be squared at their extremities; and upon these are fixed other pieces of wood, well squared and sawed, of about six or seven inches breadth, by five in depth, with pegs of wood: these pieces are placed on each side of the road, along its whole length: they are commonly placed at four feet distance from each other, which forms the interior breadth of the road."

By this wooden rail, the wheels of the carriages were freed from the friction of the gravel or earthy soil, and a great increase of speed and decrease of horse-labour is the result. But the rails were found to wear away very quickly; this led to the plan of laying a second rail on the top of the one first formed, by which a much longer duration of the rail could be calculated on. A horse could draw, in a wagon on a common road, 17 cwt. of coals; while on these wooden railroads, imperfect as they were, a horse could easily draw 42 cwt.

For many years nothing further was attempted in the railway system: the collieries were the only places where they were employed; and canals were then the favourite mode of conveying merchandise from one part of England to another.

It appears to have been about the year 1768 that the idea of employing cast-iron rails instead of wood was first acted on; for it was in the preceding year that we have the first evidence of the making of such rails at the iron works in Colebrook-dale. In 1776, iron rails were laid down upon the Duke of Norfolk's colliery, near Sheffield: these rails were cast in pieces about six feet long, and laid down upon wooden bearers or "sleepers," similar to those used with the wooden rails.

The next improvement was one of a marked and decided character:—it was, the substitution of stone supports for wooden ones. The plan of laying down wooden sleepers across the road begun gradually to be abandoned: and instead of them, stout solid stone blocks were laid down at the joinings of the several pieces of the rail,—one block to each joint. By this improvement it is evident that the bearings or supports for the rails were likely to be more lasting than those which were made of wood. This improvement was introduced about 1797.

This was, then, the state of railroads, or as they were then called *tram*-roads, at the commencement of the present century. They became gradually adopted to a great extent at the Welsh collieries. In 1791, there was scarcely a single railway in South Wales; but by the year 1811, there were no less than 150 miles of railway in Monmouthshire, Glamorganshire, and Caermarthenshire; and at the present time they amount to between three and four hundred miles. In these cases the wagons and wheels were extremely small. As an instance of the railways of those days, we will take that at the Penrhyn slate works, commenced in 1800, and finished in 1801. It was six miles and a quarter in length. Twenty-four small wagons, each containing one ton, were drawn by two horses (one stage) six times a day; which is 144 tons per day. Ten horses, by the use of this railway, drew as much as four hundred had been accustomed to draw on the common roads.

In 1803, a Mr. Woodhouse proposed that common roads, and even streets, should derive the advantages of the railroad system, by having concave iron rails laid down, protected, by a course of stone on each side, from being covered with gravel, earth, &c. This plan has, we believe, never been adopted so far as the busy streets of a town are concerned, but an approach towards it has been made in the Commercial Road, and in Friday Street, London, by laying down courses of granite stones for the wheels of heavy vehicles to roll upon.

It would be altogether beyond our limits were we to attempt to describe the progressive improvements in the form and manufacture of the rails,—in the bearings on which they are placed,—and in the mode of joining them end to end, so as to form a continuous and smooth surface. We can only here allude to the adoption of wrought-iron rails instead of cast-iron. These are formed by passing bars of iron, when red-hot, through rollers with indentations or grooves in their surfaces corresponding to the intended shape of the rails; and are generally from twelve to fifteen feet in length.

But we have now to advert to other and almost equally important points of the subject. We have said that the adoption of wooden or iron rails was for the purpose of lessening the amount of friction experienced by vehicles passing along roads. The next subject of attention is, whether these rails shall be laid down on a common road, used for the purpose of general traffic, or whether it be necessary to construct a new road for the purpose. Let us take the London and Birmingham road as an example to which to refer our reasoning. The old coach road resembles most other roads in being full of turns, windings and angles; and also in traversing hills and dales,—sometimes descending and at others ascending. Both of these circumstances *greatly retard the progress* of a vehicle moving along such a road, and increase the danger of overturning, &c. Therefore any arrangement by which the road could be made straighter and more level, would be a direct benefit in many ways.

It is, however, scarcely possible to estimate this part of the question in its proper light, without making reference to the means by which vehicles are drawn along the roads, whether by animal or steam power. We shall, therefore, proceed to that very important part of our subject.

The *horse* is the animal employed, under common circumstances, to draw our vehicles. The great power which this noble animal possesses, the facility with which he is taught, and the docility which he displays, strongly qualify him for this duty. Not only our vehicles on land, but also our barges on canals, are drawn by horses (for we may consider a canal to be a perfectly level liquid railroad); and it is doubtful whether any other animal would possess so many advantages and qualifications in this respect.

But still, animal power has its limit. We know that the human muscles will not bear beyond a certain amount of exertion; and the carrier or the coachman knows how far he ought to tax the strength of his horse; and, therefore, if an increased speed is to be attained, or an increased weight to be borne, an addition must be made in the number of horses employed. There are various different ways of estimating the strength of the horse: that one adopted by Mr. Smeaton was, that a horse could draw 200 pounds for eight hours a day, at 2¼ miles per hour. But whether or not this statement be strictly received, one thing is certain, that even with a small load, a horse cannot exceed a certain amount of speed without being injured; our mails have rarely exceeded ten miles an hour, even with all the improvements applied to them.

The important question arises, therefore,—to what other source are we to look for a moving power? The magical effects (for they are almost magical,) of the *steam-engine*, and especially its application to navigation, naturally induce us to look to that as the means of obtaining a new moving power; and the same tendency which we now have to look to that source, as to a gigantic friend, was seen in some of the earlier promoters of the steam engine, even before its immense power was one-tenth part developed. The history of steam locomotion requires that its application to common roads should be spoken of before the application to railroads we will, therefore, proceed at once to that subject.

For a long period after the invention of the steam-engine its use was almost solely confined to drawing up water, and other similar operations; but it remained for James Watt to give it a power which (if it were not too bold) we would call illimitable, by giving it a rotatory power, as well as a longitudinal one. This rotatory power was applied to propelling machinery of all descriptions; and it is not surprising that the idea should have occurred to ingenious men, that as the motion of a carriage depends on the rotation of a wheel, it might be possible to use a steam-engine to bring about that rotation. Watt says:—

"My attention was first directed, in the year 1759, to the subject of steam-engines, by the late Dr. Robison, then a student in the University of Glasgow, and nearly of my own age. He, at that time, threw out an idea of applying the power of the steam-engine to the moving of wheel-carriages, and to other purposes; but the scheme was soon abandoned on his going abroad."

Twenty-five years afterwards, when Watt's mind had been deeply imbued with the subject, he included in one of his patents a mode of applying the steam-engine to the moving of wheel-carriages.

It is not, however, till 1802 that we meet with anything on this subject that need detain us here. In that year, Messrs. Trevithick and Vivian took out a patent for the first locomotive steam-engine. Watt's engines had acted by the power of low-pressure steam; but the new projectors employed the power of high-pressure steam, which, by not requiring the condensing apparatus, could be included in a smaller space. These patentees, indeed, made some admirable improvements in the steam-engine itself,—a locomotive carriage being only one of the purposes to which it was applicable. The carriage which they made was, in form, very much like a stage-coach, and the manner in which the steam-engine was combined with the machinery necessary for the motion of the carriage, (though too intricate to be described here) was admirable for its ingenuity. This carriage was frequently seen driving about in some of the waste grounds in the neighbourhood of London.

In 1811, a patent was taken out by Mr. Blenkinsop, for a steam-carriage to be used for the conveyance of coals and other commodities along a common road. On one side of the road was laid down a rail with indentations along its whole extent; into which worked the teeth of a wheel attached to a steam-carriage: the action of the steam caused the wheel to revolve, the teeth of which, by catching in the cogs of the rail, propelled the carriage. This carriage was capable of drawing twenty-seven wagons, weighing ninety-four tons, on a dead level, at 3¼ miles per hour; and when lightly loaded, it travelled ten miles an hour.

In the following year, another engine, made by Messrs. Chapman, drew after it eighteen loaded coal-wagons, weighing 54 tons, up a gentle ascent of forty-six feet in a mile, at the rate of ten miles an hour.

The next contrivance was one by Mr. Brunton, in which the carriage was provided with two appendages which were intended to act somewhat on the principle of the hinder legs of a horse in walking: the invention, however, did not ultimately succeed.

In 1816, Messrs. Stephenson and Losh made several great improvements in locomotive engines, as well as in the form of the rails of a railway in which they were to be employed. Steam-carriages of their construction have been at use in the Killingsworth colliery near Newcastle, and at Hetton colliery on the Wear.

From this period, newly patented improvements for steam locomotive engines for common roads increased so rapidly, that it is quite impossible for us even to mention them all in this brief sketch; but, fortunately, it is not necessary to do so, since they one by one fell to the ground, for some cause or other. There are only a few of them which we shall deem it necessary to mention.

Mr. Gurney's steam-carriage, which was first used in 1827, is thus described in a journal of the time:—

"The carriage is constructed for accommodating six inside and fifteen outside passengers, independently of the guide, who is also the engineer. In front of the coach is a very capacious boot, while behind that which assumes the appearance of a boot is the case for the boiler and the furnace, from which no inconvenience is experienced by the outside passenger, although, in cold weather, a certain degree of heat may be obtained, if required. The length of the vehicle, from end to end, is fifteen feet, and with the pole and pilot wheels, twenty feet. The diameter of the hind wheels is five feet; of the front wheels three feet nine inches; and of the pilot wheels, three feet. There is a treble perch, by which the machinery is supported, and beneath which two propellers, in going up a hill, may be set in motion, somewhat similar to the action of a horse's legs, under similar circumstances, which assist in forcing the carriage to the summit. The total weight of the carriage and all its apparatus is estimated at a ton and a half, and its wear and tear of the road, as compared with a carriage drawn by four horses, is as one to six."

The last name that we can allow ourselves to allude to on this part of the subject is Mr. Hancock, whose locomotive carriages for common roads have been more successful than any that preceded them, although, from various causes, they have not maintained a permanent stand.

Mr. Hancock has, at different times, built several steam locomotives, which he has called, the Experimental Carriage, the Infant, the Era, the Enterprise, the Autopsy, the Erin, the German Drag, the Irish Drag, the Gig, and the Automaton,—the last of which is the one represented in the annexed cut, fig. 2.

Fig. 9.

HANCOCK'S AUTOMATON.

The Experimental Carriage made many trips in the neighbourhood of London; but it was in the year 1831, and with that carriage which he called the Infant, that the first attempt was made to ply a steam locomotive engine for hire, on common roads. The carriage in question plied between London and Stratford: every eight miles the driver took in water and coke: the average time of getting up the steam was about twenty minutes, and about a bushel of coke was used for that purpose at starting: the fore part of the vehicle was for passengers, and the hinder for machinery. In October, 1832, this carriage went to Brighton, with a load of 11 passengers.

The other carriages which we have mentioned were made by Mr. Hancock, either on private speculation, or as orders; and although their outward appearance differed considerably, the principle on which they were constructed was nearly identical. The average working speed of the carriages was from 10 to 12 miles an hour, and the cost of fuel about two pence halfpenny per mile.

But scientific difficulties have not been the only ones which the projectors of steam-carriages on common roads have had to contend against: excessive tolls demanded by the turnpike trusts, the opposition of interested parties, and the prejudices of the public generally, threw many embarrassments in the way of the adoption of these inventions.

In order that something like fair play should be afforded to his carriage, Mr. Gurney petitioned Parliament for its aid, upon which a committee was appointed to investigate the matter, and a very favourable report resulted, which concluded with the following summary:—

"Sufficient evidence has been adduced to convince your committee,—1. That carriages can be propelled by steam on common roads, at an average rate of ten miles an hour. 2. That at this rate they have conveyed upwards of fourteen passengers. 3. That their weight, including engines, fuel, water, and attendants, may be under three tons. 4. That they can ascend and descend hills of considerable inclination with facility and safety. 5. That they are perfectly safe for passengers. 6. That they are not (or need not be, if properly constructed) nuisances to the public. 7. That they will become a speedier and cheaper mode of conveyance than carriages drawn by horses. 8. That as they admit of greater width of tire than other carriages, and as the roads are not acted on so injuriously as by the feet of horses in common draught, such carriages will cause less wear of roads, than coaches drawn by horses. 9. That rates of toll have been imposed on steam-carriages, which would prohibit their being used, on several lines of road, were such charges permitted to remain unaltered."

The principal obstacles to the introduction of locomotive carriages on common roads, were considered to be the weight of these carriages themselves, and the mode of propulsion, which no common road would be able to bear for any length of time, without great injury. In the above report the committee state that, however strong their conviction may be of the comparatively small injury which properly constructed steam-carriages will do to the roads, yet this conviction is founded more on theory, and perhaps what may be considered as interested evidence, than practical experience. They therefore recommend that the House should not make, at that time, any permanent regulations in favour of steam. The experience of a few years would enable the Legislature to form a more correct judgment of the effect of steam-carriages on common roads. They therefore recommend that the tolls imposed on steam-carriages by local acts, where they shall be unfavourable to steam, be suspended during three years, and that, in lieu thereof, the trustees shall be permitted to charge toll, according to a rate agreed on by the committee.

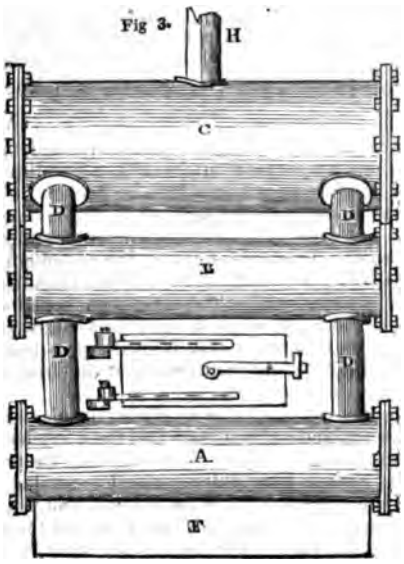
It was not anticipated by the committee that steam would be used as a propelling power on common roads for heavy wagons. It seemed to be the general opinion of witnesses that in proportion as the velocity of travelling by steam on common roads is diminished, the advantages of steam over horse-power are lost. The efficiency of horses in draught is rapidly diminished as their speed is increased; while, on the contrary, the weight which could be carried or propelled at any great velocity by steam, could not be more cheaply conveyed, were the speed decreased to that of the slowest wagon. Indeed, Mr. Gurney considers that under four miles per hour horses can be used in draught more economically than steam. From other parts of this report it appears that the greatest speed obtained by Mr. Ogle's carriage amounted to between thirty-two and thirty-five miles per hour; that it has attained sixteen and a half miles an hour on a slope rising one in six; that thirty-six persons have been in one carriage; and that it has drawn five times its own weight at from five to six miles an hour.

Steam-carriages for common roads have been made by Mr. Hancock and Mr. Gurney, exactly resembling in shape

an omnibus, a stage-coach, a britschka, and even a gig. The various points of difference between these vehicles, and the modes in which the different parts of the engine are connected with the wheels, the body of the carriage, &c., we cannot here enter upon; but we may perhaps direct a few moments' attention to the different modes in which Mr. Hancock and Mr. Gurney constructed the *boilers* of their engines. Much of the efficacy of a steam-engine, whatever may be the purpose to which it is applied, depends on the form and strength of the boiler, and its connexion with the fire-place.

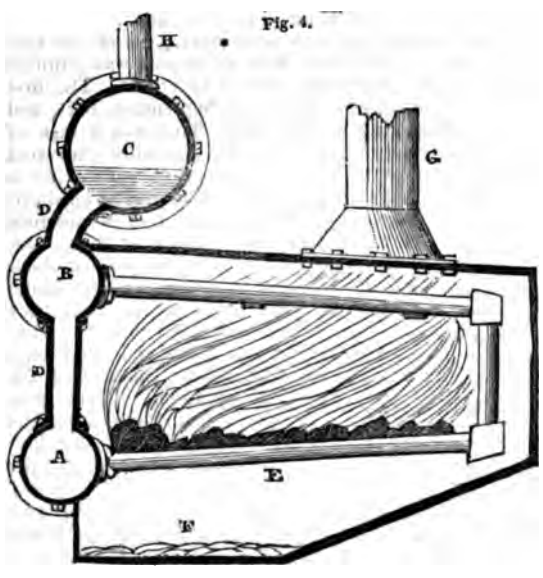
In Mr. Gurney's locomotive carriage, the bars of the grate are made hollow, and contain water. The construction of his boiler is shown in the following side and front views of it. It consists of two cylindrical vessels, A and B, figs.

Fig 3.



3 and 4, placed in front of the fire, and above them is the vessel C, called the *separator*. This latter vessel alone contains steam, the others being full of water. These three vessels communicate by means of the passages D D D D, and from the back of the lower vessel A proceed twelve tubes, which serve as a grate for the fire. One of these is seen

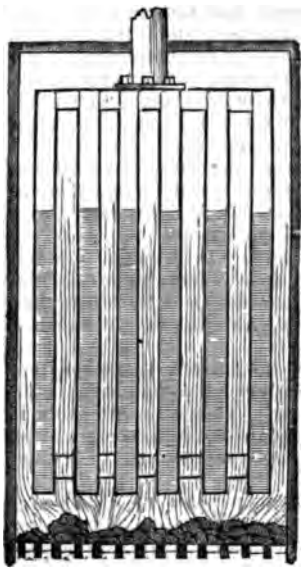
Fig. 4.



at E, fig. 4. Below them, at F, is the ash-pit. After traversing the back of the fire-box, they arrive at the vessel B, as seen in the side-view. The flame and smoke play round and between these tubes, and vaporize very rapidly the water in them. The steam, as it is formed, passes up into the separator C, and its place is supplied by cold water, descending through the passages D D. Thus a very quick circulation is regularly kept up. The chimney is at G, and the opening of the main steam-pipe at H.

In the boiler of Mr. Hancock's carriage, the water is contained between a number of upright plates of iron, as in the annexed lateral view, fig. 5. The water is thus distributed into thin sheets, between which the flame and smoke pass up from the fire below, to the chimney. The plates are connected together by tubes at the bottom and top, the former for the water, and the latter for the steam.

Fig. 5.



We have thought it necessary to give these few details respecting the use of steam locomotives on common roads, previous to speaking of their introduction on railways: on another occasion we propose to enter into particulars to show the manner in which the steam-engine is made available for the purpose of locomotion; our present object being rather to supply a brief history of railways in general than to describe minutely their details.

We may here notice, before speaking of the application of steam power to railways, that at many of the collieries, the wagons had been moved simply by the force of gravity. We have said that in most cases the road descends from a mine to a sea-port: consequently, when a rail was laid down on such a road, a loaded wagon would descend from its own weight, and would even require a counteracting weight to prevent it from descending too rapidly. Now it occurred to some persons that this counteracting weight might consist of the empty wagons, by having a rope or chain passing round a system of pulleys at the top of the inclined plane, so that as the loaded wagons descended by their own weight, the empty wagons were drawn upwards. This mode of proceeding dispensed with horse power, and was very much used, and probably still is, at some of the collieries.

But this kind of moving power is obviously inefficient on level roads, since the force of gravity cannot be brought into requisition. This objection, however, was of no great moment up to the year 1825; for, previous to that time, railways had been confined to the mining districts. It was in that year that the principle of railways was applied to the practical purposes of general conveyance. The previously existing railways were, to use the words of a recent writer, "isolated and private undertakings, confined to the mining districts; and therefore, very few persons had an opportunity of witnessing their operations. To the many, this subject was as yet a dark shadow in the womb of futurity. But from out the midst of this darkness, a new era was ushered to the wondering world. It was the birth-struggle of a giant power, destined ere long to bear down, like the rushing of a mighty torrent, all existing barriers, and give a direction, hitherto unknown, to the leading features of our social institutions; to annihilate,—or, at least, immeasurably extend,—the bounds of time and space; to convert our hills and our valleys into level plains; to throw up towering mountains, and scoop out dread deeps for himself from the very bowels of the earth."

The railway to which we have alluded was the Stockton and Darlington, the first for which an Act of Parliament was obtained, and which was opened in September, 1825. This line is but short, and is situated in the southern part of the county of Durham. The importance to be attached to this railway is on the ground, that it was the first one applied to the purposes of public conveyance, and not to the importance of the towns which it connects. We shall not therefore dwell on the details of its construction, but proceed to notice, at tolerable fulness, a railway which has been and always will be, of immense importance, both in a commercial and in an engineering point of view:—we mean the Liverpool and Manchester.

These two great towns stand in a remarkable and closely-linked relation to each other. The staple wealth of Manchester consists in the cotton manufacture which is carried on there; while Liverpool is the port at which the raw cot

ton, to be worked up at Manchester, is landed from foreign countries, and from whence the manufactured goods are again exported: Liverpool is, therefore, at once the vein and the artery connecting Manchester with foreign nations. The consequence of this has been, that the traffic between those two towns has been immense; and it is natural to suppose that any and every means of facilitating the com munication from one to the other would be eagerly attended to. Consequently, when canal navigation became prevalent in England, that mode of transit was not lost sight of by the merchants of Liverpool and the manufacturers of Manchester. For a number of years the greater part of the merchandise was conveyed from one town to the other either by the Mersey and Irwell navigation, or by the Duke of Bridgewater's canal. But from the deficiency of water in Summer, the barges could not carry their usual freights; and from the operation of frost in Winter, the canal was frequently for weeks unnavigable. It is not, therefore, surprising that the efficacy of railways should have become a question for serious consideration.

In 1822, Mr. James, a London engineer, suggested the propriety of constructing a railway, such as had been found so advantageous in the collieries. This plan met with a good deal of attention; and in 1824, a Mr. Sandars published a pamphlet in recommendation of it. In this pamphlet he says,—

"Notwithstanding all the accommodation the canals can offer, the delays are such, that the spinners and dealers are daily obliged to cart cotton on the public high road, a distance of thirty-six miles, for which they pay four times the price which would be charged by the railroad, and they are three times as long in getting it to hand. The same observation applies to manufactured goods, which are sent by land carriage daily, and for which the rate paid is five times that which they would be subject to by the railroad. This enormous sacrifice is made for two reasons:—sometimes because conveyance by water cannot be promptly obtained, but more frequently because speed and certainty, as to delivery, are of the first importance."

One hundred and fifty merchants, who assented to the truth of these statements, set about establishing a company; and went to view the progress of the railroad then building from Stockton to Darlington. The result was so favourable, that proceedings were immediately set on foot: a permanent committee was appointed, and in October, 1824, a prospectus was issued. The estimated expense was 400,000*l.*; and the probable charge for carriage of goods was stated at ten shillings per ton,—two-thirds of the sum demanded by the canal companies.

An Act of Parliament being necessary to carry out the objects of the company, a portion of the committee went to London, in February, 1825, for the purpose of conducting the measure through Parliament. The opposition to it was very strong:—the proprietors of the Bridgewater canal, the Leeds and Liverpool canal, and the Mersey and Irwell navigation, together with some of the landed proprietors through whose estates the railway would pass, strenuously opposed it; some on the plea that it would interfere with their interests, others because it would destroy the beauty of their estates. The result was, that the bill was lost by a majority of one.

In the following year some improvements were made in the line of road chosen by the engineers,—some proposals were made, tending to soften the hostility of the opposing parties,—and another bill was brought in. The third reading was carried, in the House of Commons, by a majority of eighty-eight to forty-one, and in the Lords without a division. Thus did the company at last obtain their act, after 70,000*l.* had been spent in parliamentary proceedings.

On the 29th of May, 1826, the first general meeting of the company was held, and Mr. G. Stephenson appointed engineer of the company, having filled the same office for the Stockton and Darlington railway. Operations were commenced on Chat Moss, a district which had been the subject of much discussion in and out of Parliament. The moss consists of a huge bog, in some places thirty feet deep, and consisting of soft and pulpy matter in such a fluid state, that an iron rod would sink through it by its own weight.

To carry a road over this bog was deemed such an impracticable scheme, that even a civil-engineer denounced it, and afforded an instance of incautious prejudgment,—as the following extract from the parliamentary proceedings will show:—

Question. Tell us whether, in your judgment, a railroad can be safely made over Chat moss, without going to the bottom of the bog?

Answer. I say *certainly not.*

Q. Will it be necessary, therefore, in making a permanent railroad, to take out the whole of the moss to the bottom, along the whole line of road?

A. Undoubtedly.

Q. Will that make it necessary to cut down the thirty-three or thirty-four feet of which you have been speaking?

A. Yes.

Q. And afterwards to fill it up with other soil?

A. To such a height as the railway is to be carried; other soil mixed with a portion of the moss.

Q. But suppose they were to work upon this stuff, could they get their carriages to the place?

A. No carriage can stand on the moss short of the bottom.

Q. What would they do to make it stand,—laying planks or something of that sort?

A. Nothing would support it.

Q So that if you could carry a railroad over this fluid stuff, if you could do it, it would still take a great number of men, and a great sum of money. Could it be done, in your opinion, for £6000?

A. I should say £200,000 would not get through it.

Q. My learned friend wishes to know what it would cost to lay it with diamonds?

Such a witness may well have been surprised, perhaps mortified, to see, a few years afterwards, a fine line of railroad thrown over the very bog which he declared to be impassable;—to see carriages going over it *without going to the bottom*,—carriages laden with tons of merchandize; and, instead of common diamonds, forming the pavement, to see "*black diamonds*" whirling over it to feed the furnaces of thousands of factories, which this fine road benefits:—and to reflect that the road, which he had declared would cost more than 200,000*l.*, actually cost, from the first draining of the bog, to the subsequent completion of the line over its surface, no more than 30,000*l.*

But to return. On this bog were placed hurdles of brushwood and heather, and on them were laid the wooden sleepers which were to support the rail. It is supposed there are as much as sixty million tons of decomposed vegetable matter forming the bog; and over this the railway had to pass for a distance of five miles. At the eastern part of the bog the surface was too low for the purpose of the railway, and it had to be raised by an embankment, half a mile in length, and twenty feet high. Some idea of the semi-fluid state of the bog may be formed from the circumstance, that the embankment which was raised, pressed down the original surface of the bog, and many thousand cubic yards of embankment gradually and silently disappeared by sinking into the bog. But the engineer persevered, and added more and more solid material, until the substratum became firm and secure, and no more sinking ensued.

While this was going on, several other parts of the railway were also in progress. Part of the plan was a tunnel under the greater part of the town of Liverpool. The first shaft of this tunnel was opened in September, 1826, and the horizontal digging commenced. This was a task of great difficulty; for in some parts the substance excavated was a soft blue shale, with abundance of water; and in other parts a wet sand presented itself, requiring no slight labour and contrivance to support, till the roof of masonry was erected. At one part, when working at thirty feet below the surface of the ground, the whole superincumbent mass of moss-earth and sand fell in. This disaster made the miners rather fearful, and it was with difficulty they could be persuaded to proceed with their work. Other parts of the tunnel were cut through a fine red sandstone, which was so firm and secure that it forms the roof of the tunnel, no other masonry being required. There were eight shafts, or vertical openings, descending from the ground to the tunnel, and the miners dug from one shaft to another, by making lateral excavations which formed the tunnel.

By the month of January, 1827, the works were in progress along the whole line; and during the years 1828 and 1829 bridges, embankments, and all the various portions of the undertaking, were in active progress. In the Darlington railway there was only one pair of rails laid down; so that if two carriages were going in opposite directions, it would be necessary that one should go a little out of the direct line, in order to allow the other to pass. This was effected by having extra portions of railway, called *sidings*, placed at intervals along the line. But where such great traffic is carried on as between Liverpool and Manchester, it was foreseen that great inconvenience and loss of time would result from such an arrangement. It was therefore resolved to have a double pair of rails for the whole distance.

one pair for carriages going in one direction, and the other for those moving in the opposite direction.

When the railway was first set on foot, it was not determined what kind of moving power should be used, whether horses, fixed engines, or locomotive engines:—this confirms our previous remark, that the diminution of friction is the most prominent benefit derived from a railway. While the railway was in progress the subject of motive power underwent discussion. It was soon decided that horse power should be rejected as least eligible; and it then became a subject of inquiry whether fixed engines or locomotive engines should be employed. The directors were nearly equally divided in opinion as to which of these two modes should be adopted; *i. e.*, whether to have a stationary steam engine, which should draw vehicles along by means of a rope or chain; or whether to make the engines themselves move, and draw the vehicles after them. In order to decide this point, it was deemed desirable to bring competition to their aid, by offering a premium to the inventor or owner of the engine which should best perform certain stipulated tasks. On the 25th of April, 1829, the directors offered 500*l.* premium for this object. Among the stipulations were,—that the engine should produce no smoke; that the pressure of the steam should be limited to fifty pounds on the square inch; that the engine should draw at least three times its own weight, at the rate of not less than three miles an hour; that it should be supported on springs; that it should not exceed the height of 15 feet,—and that the price of the engine should not exceed 550*l.*

On the 6th of October, the trial of skill took place. The engines competing were,—the Rocket, by Stephenson, the Novelty, by Braithwaite and Ericson, the Sans Pareil, by Hackworth, and the Perseverance, by Burstall. The load attached to each engine was three times the weight of the engine itself. The utmost precautions were taken to let all the engines have an equally fair trial, and three engineers, unconnected with the competition, were chosen as judges. The engine first tried was the Rocket: its average rate of progress was about fourteen miles per hour, and its consumption of water 114 gallons, and of coke 217 lbs., in the same space of time. The next engine was the Sans Pareil, which, with the trains attached to it, weighed nineteen tons, two more than the Rocket. The average rate at which it moved was fifteen miles an hour, with a consumption of 150 gallons of water, and 692 lbs. of coke, in the same time; but during the experiment, some of the boiler work got out of order, and the engine could not complete the task assigned to it. The next engine tried was the Novelty: the weight of this engine and its load, in consequence of some improvement in the construction, was only 10¾ tons; but during its progress an accident happened to it, which occasioned a delay of two or three days. On the 14th the trial took place; but another accident induced the proprietors of the engine to withdraw from farther competition. This engine, *i. e.* the Novelty, which, without reference to the result of the competition, is considered a beautiful specimen of mechanical ingenuity, is represented in the annexed cut, fig. 6.

Fig. 6.

THE NOVELTY.

The last engine, the Perseverance, also met with an accident; and thus, singularly enough, three out of the four engines were put out of condition for showing their full powers. The result of the trial was, that the prize was awarded to Mr. Stephenson, inventor of the Rocket engine.

The engines having been fixed upon, the proceedings of the directors assumed a decided turn, and all was prepared, and by September 15th, 1830, the railway ready to be opened,—a ceremony which was performed in great state, commensurate with the national importance of the undertaking. The Duke of Wellington, Sir Robert Peel, Mr. Huskisson, and a number of other distinguished persons, were invited to be present. There were eight locomotive engines employed; viz., the Rocket, the Northumbrian, the Phœnix, the North Star, the Dart, the Comet, the Arrow, and the Meteor; all built by Messrs. Stephenson, and nearly on the same principle as the successful Rocket engine. The ceremony was splendid and completely satisfactory, so far as the efficacy of the railway and of the engines was concerned; but a cloud was thrown over the joy of the day by the accidental death of Mr. Huskisson, M.P. The carriage in which the Duke of Wellington, Mr. Huskisson, and other distinguished persons in the procession were seated, occupied, at one part of the trip, one of the lines of railway, in order that the occupants might see all the other engines and trains pass by. Several gentlemen had embraced the opportunity of alighting from the state-carriage, and were walking about on the road; among which number was Mr. Huskisson, who caught the eye of the Duke of Wellington. A recognition immediately followed, when the duke extended his hand, which Mr. Huskisson advanced to take. At this moment the Rocket came rapidly forward upon the other line, and a cry of danger was raised. Several gentlemen succeeded in regaining the state-carriage; but Mr. Huskisson, who was in a weak state of health, became flurried; and after making two attempts to cross the road upon which the Rocket was moving, ran back in great agitation to the side of the duke's carriage. White, the engineer, saw the unfortunate gentleman, as the engine approached, in a position of imminent danger, and immediately endeavoured to arrest its progress, but without success. Mr. Holmes, M. P., who had not been able to get into the carriage, stood next to Mr. Huskisson, and perceiving that he had altogether lost his presence of mind, called upon him "to be firm!" The space between the two lines of rails is just four feet; but the state car, being eight feet wide, extended two feet beyond the rail on which it moved, thus diminishing the space to two feet between its side and the rail on which the Rocket was moving. This engine also projected somewhat over the rail on which it ran; thus still further diminishing the standing-room to not more than a foot and a half, when the vehicles were side by side on the opposite rails. In addition to this, the door of the state car happened to be wide open; so that it was impossible for the Rocket to pass without striking it. Mr. Huskisson had just grasped hold of this door when he was warned of the approach of the Rocket. Mr. Littleton, M.P., had sprung into the state-car, and had just pulled in Prince Esterhazy, when he saw Mr. Huskisson, alarmed and agitated, grasping the door with a trembling convulsive hold. At this moment the Rocket struck the door, and Mr. Huskisson was thrown to the ground, across one of the rails of the line on which the engine was advancing, the wheels of which went over his leg and thigh, and fractured them in so dreadful a manner, as to produce death before the lapse of many hours.

We must now present a few details of the railway, as it is seen in its finished state. The rails are of rolled iron, two inches broad and one inch thick, in lengths of twenty-five feet each. These are firmly fitted together, and placed upon cast-iron chairs or pedestals, and the whole supported, at intervals of three feet, by stone blocks, twenty inches square and twelve deep. Into each of the blocks two holes are drilled, and filled up with oak plugs; and to these the pedestals bearing the rail are spiked down. On the embankments, and other places where the foundation may be expected to subside, additional firmness is secured by the introduction of oak sleepers. The whole length of the road is thirty-two miles; and posts are placed every quarter of a mile, to mark the distances.

There are stations and depôts at distances of a mile from one another along the road; and an admirable system of signals has been adopted, for the prevention of accidents, and other purposes. Each of the locomotive engines has

Fig. 7.

LOCOMOTIVE CARRIAGES.

immediately behind it a "tender," or light open vehicle, containing a supply of fuel and water, with the engineer and his assistant; and after the tender comes a train of from five to twenty carriages, according to circumstances

These carriages are of different kinds,—some to carry passengers, others merchandize and luggage, and others live cattle.

Fig. 7 represents one of the engines, the tender belonging to it, and two close carriages attached. Fig. 8 will give an idea of some of the open carriages employed.

Fig. 8.

OPEN CARRIAGES.

The original estimate for the railway was, as we have said, 400,000*l.*; but the total outlay, including engines and carriages, was not far short of a million sterling.

In order to convey a better idea of the nature of the undertaking, we will conduct our readers in a trip from Manchester to Liverpool, pointing out the objects most worthy of notice on the way; but it will help more clearly to convey to the mind the nature of the road, if we previously say a few words respecting the inclined planes which occur during its length. At Liverpool the Docks are sixty-six feet below the level of Manchester, and at a short distance from Liverpool the land rises to no less than one hundred and sixty-nine feet above the Docks, or lowest end of the line, at Liverpool. Now all these circumstances make it necessary that skill must be shown in making the descent from the highest to the lowest points, as gradual and convenient as possible. There are a few short spaces perfectly level, and the remainder of the road is cut in inclined planes, of which the following is an enumeration:—

		With an inclination of
The tunnel from Wapping (Liverpool), to Edge Hill being an inclined plane, whose length is....	1970 yards ..	1 in 48
Level by cutting	1000 ,,	
Wavertree to Hayton	5¼ miles ..	,, 1092
Wiston inclined plane	1¼ ,, ..	,, 96
Rainhill level	1¼ ,,	
Sutton inclined plane	1¼ ,, ..	,, 96
Parr Moss to Sankey canal and viaduct	2¼ ,, ..	,, 2640
Sankey viaduct to Bury lane	6¼ ,, ..	,, 880
Chat Moss	5¼ ,, ..	,, 1200
Baston, Eccles, & Munches levels.	4¼	

On entering the railway station in Manchester, we ascend to the second floor of the building, and from thence emerge on the railway, so very elevated is it at the Manchester terminus. A handsome arch carries the railway across Water Street; and shortly afterwards we arrive at the river Irwell, over which it passes by a two-arched stone bridge, thirty feet above the level of the river. The natural level of the ground soon rises very rapidly, so that instead of passing *over* the natural roads, rivers, &c., the railroad for some distance passes *under* them, since an almost perfect level is one of the great desiderata in a railway. There is at this part a depôt for the reception of cattle from the surrounding country, intended to be conveyed along the railway. It consists of a large yard surrounded with sheds; pens are erected in front of the buildings; and the cattle vans, which are kept at a station a short distance from this spot, are brought near the pens, from which the cattle are driven into the vans.

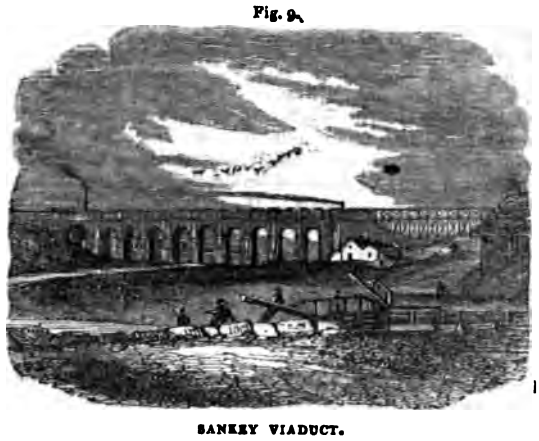
The railway is then carried along the side of a hill to the village of Eccles, and then over the Worsley canal by a viaduct of two arches, each twenty-five feet span. We next approach a continued embankment, about a mile in length, called Barton embankment: the land is too low at this part to allow of the railroad being carried over it, except by an elevated embankment. Several bridges have had to be built along this embankment.

This embankment conveys us to Chat Moss,—the mass of bog to which we have before alluded. There are about twelve square miles of this bog; and many attempts have been made to reclaim it, and bring it into cultivation. It is only since the construction of the railway, however, that they have shown symptoms of being ultimately successful. Moveable branch railways have been made in different directions, and little cottages have been erected and gardens formed, at those parts which are most solid: it seems most probable that capital and skill will ultimately bring all this immense bog into productive use.

Chat Moss is terminated by a little river, which the railway crosses by means of a bridge. It then passes along an embankment, called Broseley embankment, and immediately afterwards through a cutting or excavation, from which eight hundred thousand cubic yards of substance were dug, part of which was employed for the neighbouring embankment. Near this excavation, (which is called the Kenyon excavation,) two short railways join the principal one; one of which leads to Wigan, and the other to Bolton. We then come to the valley of the Newton, which requires a viaduct of four arches, of thirty feet span each. This village, with the viaduct, is represented in our frontispiece.

After passing the entrance to another short railway, leading to Warrington, we come to the vast Sankey viaduct, represented in fig. 9. The valley of the Sankey is a tract of land so low, that an extensive bridge, or viaduct, is required for the railroad to cross it. It consists of nine arches, of fifty feet span, and seventy feet above the surface of the ground. We then come to another bog, similar in character to Chat Moss, but of a smaller extent, which had to be solidified by immense embankments of earth. After passing under a beautiful stone bridge at St. Helen's, we reach the Sutton inclined plane. This is a perfectly straight line, one mile and a half in length, and presents an uniform rise of one foot in ninety-six. The summit is, therefore, eighty-two feet above the base, and an extra engine is kept there, to draw the trains up the inclined plane.

Fig. 9.



SANKEY VIADUCT.

This inclined plane terminates in a perfectly level excavation two miles in length; and we then arrive at a descending inclined plane almost exactly similar to that which the traveller had lately ascended. Now the object of these two inclined planes may be soon conceived:—had they not been formed, the intermediate excavation (the Rainhill level) must have been continued to the enormous extent of 82 feet lower, in order to gain the level of the road at either end. The Rainhill level is crossed by a beautiful bridge forming part of the Warrington road.

We then come to the Great Roby embankment and to the Olive Mount excavation, both works of immense labour, the materials dug from the latter being used for the former. The Great Roby embankment stretches across a valley of nearly two miles in width, and has an elevation, in many places, of more than forty feet above the natural surface. The lowest altitude is fifteen feet, and the breadth of the base varies from sixty to one hundred and thirty-five feet. "Mounted above the tops of trees, the traveller," to use the words of a recent writer, "looks around him over a wide expanse of country, in the full enjoyment of the fresh breeze from whatever quarter it may blow. There is a feeling of satisfaction, by no means common-place, in thus overcoming obstacles, surmounting difficulties, in making the high places low, and the rough places plain, and advancing in one straight and direct course to the end in view."

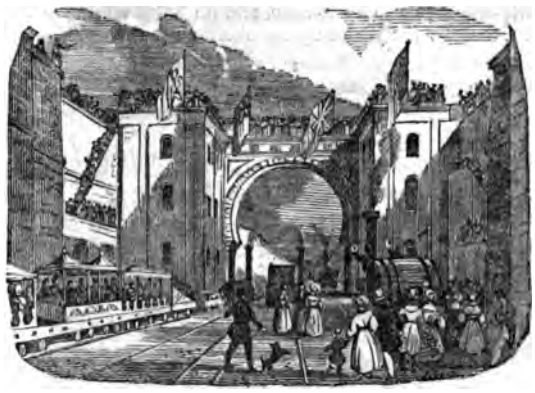
Olive Mount excavation, shown in fig. 12, is a striking example of "making high places low." It is a passage for

the railway effected by a cutting through a solid rock, seventy feet deep, about twenty feet wide, and nearly two miles in length. As Mr. Walker observes, when the excavated channel is viewed from above,—

"So diminutive a creeping creature does a man appear at the bottom of the chasm, that a spectator marvels that it is the work of human industry, and is lost in the calculation of the millions of blows with the pick-axe, the amount of human toil, and sinew and skill, that must have been exerted to remove so prodigious a mass of matter."

From the Olive Mount excavation, the whole remaining portion of the road is excavated likewise, but not to so great a depth,—varying from four to forty feet. This continues until we arrive at the grand entrance arch to Liverpool. This is a beautiful structure. It is a Moorish arch, elevated forty feet from the railway, and having a span of thirty-five feet; and at the sides of the arch, are buildings for containing two stationary engines for drawing the trains up the inclined tunnel. When we have proceeded through the Moorish arch, we find ourselves in a spacious area, dug out of the solid rock to a depth of forty feet below the natural surface of the ground. This area is perfectly level; is one hundred and fifty feet long, and seventy wide; and surrounded on all sides by embattled walls forty-six feet high. At the corners of the eastern side of the area are flights of steps leading to the ground above; and at the opposite corners are two handsome chimneys 100 feet high, belonging to the steam-engines stationed in the side buildings. Fig. 10 represents the Moorish arch, and the area to which we have just alluded: the moment of taking the drawing is at the occasion of the opening of the railway, when every accessible point was crowded with spectators.

Fig. 10.



MOORISH ARCH, LIVERPOOL.

At the western side of the area are three arches leading to the three tunnels. The centre tunnel is for the conveyance of goods to the Wapping warehouses, Liverpool; the right-hand tunnel is for the conveyance of passengers to the station in Crown Street; and the tunnel on the left is for conveying coals. The right hand, or passengers' tunnel, is 290 yards in length, and ascends in a ratio of one yard in forty-eight; which gives a whole rise of eighteen feet. This tunnel is painted white and illuminated with gas.

But the great tunnel is the object which calls most for admiration. It is twenty feet in width and sixteen feet high, and gradually descends in a perfectly straight line for 1980 yards, with an inclination of one yard in forty-eight, so that the lower end of this straight line is 123 feet lower than the upper end. At the bottom of the descent, the tunnel curves to the left for about two hundred and seventy yards: making the whole length about one mile and a third. The tunnel is painted white, and illumined with gas lamps hanging from the roof. This tunnel passes under a considerable portion of the town of Liverpool, at a depth of from five to seventy feet beneath the surface of the ground, and emerges at the lower end near the water-side. The trains are drawn up this tunnel by an endless chain or rope, which is worked by the stationary engines at the upper end. Fig. 11 represents the entrance to the tunnel at Edge Hill.

We have thus presented a rapid view of this splendid undertaking; and we may make a few additional remarks respecting the traffic on it. The time occupied in travelling from Manchester to Liverpool is about an hour and twenty minutes. The gross sum received by the company for the carriage of goods and passengers, has amounted to from *200,000l. to 250,000l.* per annum. The shareholders have,

Fig. 11.

EDGE HILL TUNNEL.

for some time past, received 10 per cent. dividend on their shares; and a 100*l.* share will sell for more than 200*l.*

The passengers and merchandize conveyed on the railway from September, 1830, to June, 1836, amounted as follows:

YEAR.	MERCHANDIZE. *Tons.*	COAL. *Tons.*	PASSENGERS.
1830 (Sept. to Dec.)	1,433.....	2,630.....	71,951
1831	43,070.....	11,285.....	445,047
1832	159,443.....	69,396.....	356,945
1833	194,704.....	81,509.....	386,492
1834	210,736.....	99,337.....	436,637
1835	230,629.....116,246.....		473,847
1836 (to June)	117,617.....	68,893.....	222,848
	1,023,120.....449,296.....		2,393,767

These annual reports have since been discontinued.

We have deemed it desirable to dwell at considerable length on the details of the Liverpool and Manchester railway, because it may be considered as a type of all the subsequent undertakings, and as comprising instances of all the various difficulties which the engineers have to contend with. But the subject is too interesting in a commercial point of view for us to quit it here. We propose to devote another Supplement to a history and description of three or four of the most important railways set on foot since the opening of the Liverpool and Manchester:—such, for instance, as the London and Birmingham, the Great Western the Manchester and Birmingham, the London and Southampton, &c.

Fig. 12.

OLIVE MOUNT EXCAVATIONS.

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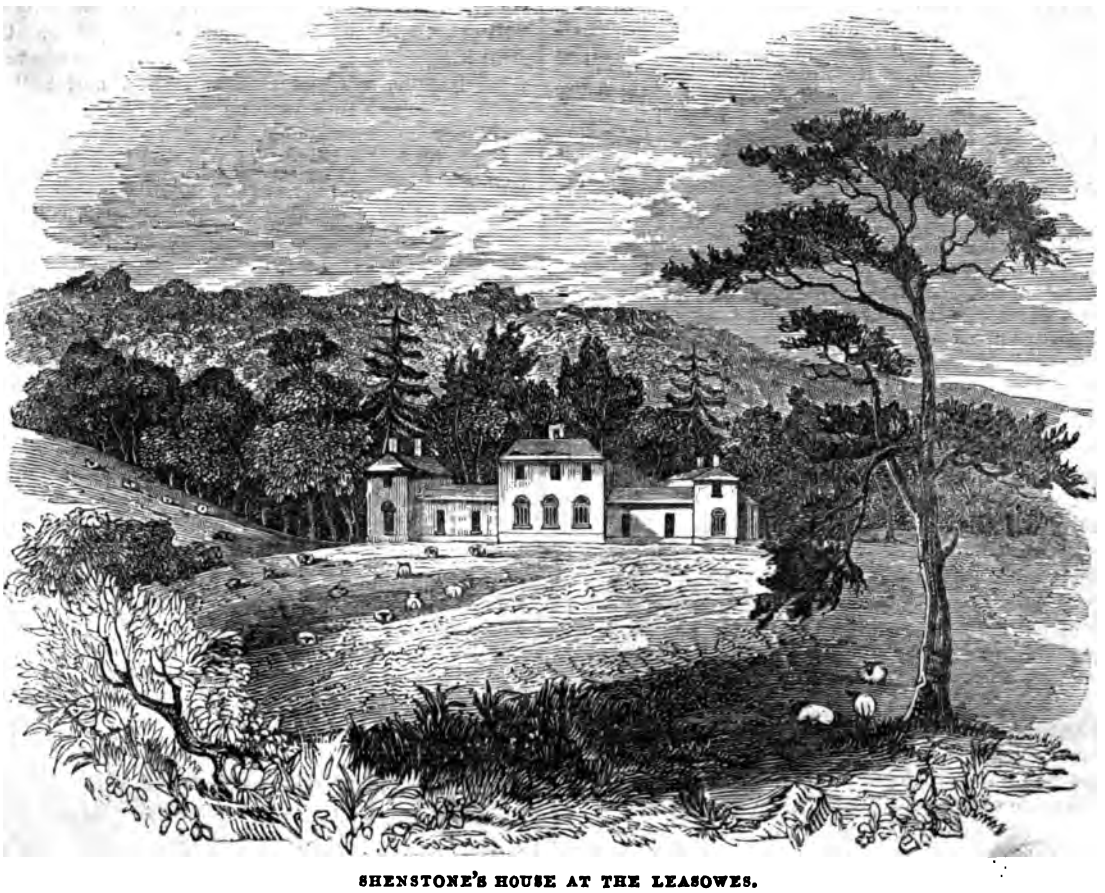
SHENSTONE AND THE LEASOWES.



SHENSTONE'S HOUSE AT THE LEASOWES.

WILLIAM SHENSTONE was born in November, 1714, at Hales Owen, in Shropshire. He was the eldest son of a plain uneducated gentleman, who farmed his own estate. His father, having a high opinion of his son's capacity, sent him to Pembroke College, Oxford, with a view to his taking holy orders; but his taste, and the feelings of his mind, did not permit him to carry to carry out the plan proposed by his sire.

Shenstone died on the 11th of February, 1763, so that he did not reach to a greater age than about forty-eight years. In the year 1745, he took the paternal estate into his own hands, and proceeded thenceforward with the two most important objects of his life,—the writing of pastoral poetry, and the formation of a rural and poetical elysium. His writings, being for the most part of a pastoral nature, that is, relating to retired country life, consist of elegies, odes, ballads, &c., the domestic virtues, the peace of solitude, the innocence of easy retirement, are the usual subjects of his verse. Simplicity with elegance distinguishes him as a writer, and if he has a tendency to sublimity, he chooses rather, from the natural indolence of his temper, to amuse himself in culling flowers at the foot of the mount, than to take the trouble of climbing the more arduous steeps of Parnassus. "In the tenderness of elegiac poetry," his biographer, Dodsley, tells us, "he hath not been excelled: in the simplicity of pastoral, one may venture to say, he had very few equals."

The poet of "the Leasowes" died at the spot represented in our frontispiece, in dejection of spirit and comparative penury; because he sought for fame, which he did not feel that he received, and injured his paternal property by unduly gratifying his taste for landscape gardening. He was continually lamenting that his house was not fit to receive "polite friends," if they were disposed to visit him; and he was even foolish enough to court the society of "persons who will despise you for the want of a good set of chairs, or for an uncouth fire-shovel, at the same time that they cannot taste any excellence in a mind that overlooks those things." He should have borne in mind that he who overlooks such things himself, must also overlook such persons. But Shenstone desired notice and applause, and his labours were directed to that end, by the means with which he felt himself likely to excel and to exhibit his excellence to the world. Hence, when he retired into the solitude of the country, he loved it not for itself, but only so far as it served to draw forth the applause of others in his own favour. Thus, by allowing his passion for rural elegance, which followed upon his taste for one species

of poetry, to be indulged to an excessive extent, he ruined his domestic affairs, and was compelled to neglect a lady to whom he had been sincerely attached.

It was, as we said, in the year 1745, that he took the management of his estate into his own hands, "and then," as his biographer, with overweening fondness and admiration, states, "he began to point his prospects, to diversify his surface, to entangle his walks, and to wind his waters; which he did with such judgment and such fancy, as made his little domain the envy of the great, and the admiration of the skilful; a place to be visited by travellers, and copied by designers. Whether to plant a walk in undulating curves, and to place a bench at every turn where there is an object to catch the view; to make water run where it will be heard, and to stagnate where it will be seen; to leave intervals where the eye will be pleased, and to thicken plantations where something is to be hidden, demands great powers of mind."

We trust that the following condensed account of the circuit of the plantation of the Leasowes, as it appeared in the time of its prosperity, (for it has now fallen into decay,) will suffice to convey a general idea of this once celebrated place.

About half a mile short of Hales Owen, in the way from Birmingham to Bewdley, the visiter, quitting the great road, turned into a green lane on the left hand, and descending in a rounding manner to the bottom of a deep and shaded valley, passed through the "Priory gate." Here, at the bottom of the lawn that surrounded the house, he entered upon a winding path, with a piece of water to the right. The path and water, overshadowed with trees growing upon the slopes, rendered the scene at once cool, solemn, and sequestered, seeming, by contrast with the road just left, a sort of subterraneous region. In going on down the valley, he passed beside a small root-house, where on a tablet were the following well-known lines:—

Here, in cool grot and mossy cell,
We rural fays and fairies dwell;
Though rarely seen by mortal eye,
When the pale moon, ascending high,
Darts through yon limes her quivering beams,
We frisk it near these crystal streams.

Her beams, reflected from the wave,
Afford the light our revels crave;
The turf, with daisies broidered o'er,
Exceeds, we wot, the Parian floor;
Nor yet for artful strains we call,
But listen to the water's fall.

Would you then taste our tranquil scene,
Be sure your bosoms be serene,
Devoid of hate, devoid of strife,
Devoid of all that poisons life;
And much it 'vails you, in their place,
To graft the love of human race.

And tread with awe these favoured bowers,
Nor wound the shrubs, nor bruise the flowers;
So may your path with sweets abound,
So may your couch with rest be crowned!
But harm betide the wayward swain,
Who dares our hallowed haunts profane.

The visiter next entered through a gate into a part of the valley somewhat different from the former, with tall trees, high, irregular ground, and rugged scars. The right presented a cascade, the left a sloping grove of oaks. In the centre was a pretty circular landscape, appearing through the trees, of which Hales Owen steeple, and other objects at a distance, formed a part. In proceeding a few paces to another bench, the view was so altered as to have the cascade in front, thus forming a new picture. In proceeding on with the murmuring stream, he had, at the next *seat*, a sloping grove on the right, and a vista up to *the steeple of Hales* Owen on the left. Going still further down this shady valley, having to the right the rivulet trickling over pebbles, he saw it emptying at last into a fine piece of water at the bottom. The path now wound round a small hill, and entered, with a stream passing out from the lake, into another valley, somewhat more open than the former. Continuing his course by a serpentine walk, the visiter next entered a narrow glade in the valley, the slopes on each side being covered with oaks and beeches. Here was another resting-place, and the eye reposed on a fine amphitheatre of wood and thicket.

The next seat was under a fine canopy of spreading oak, with a small lawn in front, encompassed by hills and oaks, and with statues suitably disposed. Classical invitations and addresses, with memorials to bygone friends, marked certain retired and hallowed spots, of which this was one.

The visiter, entering a gate, was then led through a thicket of many sorts of willows, to a large root-house, inscribed to the Earl of Stamford, who was present at the first opening of the cascade, which was the principal object seen from the root-house, where the eye was presented with the fairy vision of an irregular and romantic fall of water. He came next to the "forest ground," and then to a natural bower of oaks, whence the eye wandered from one little glade to another. The priory was next seen peeping out from the trees; and passing through another gate, the visiter had from a seat a picturesque view, through trees, of a clump of oaks at a distance, overshadowing a little cottage upon a green hill; leaving which seat, he immediately entered a perfect dome, or circular temple, of beeches, in which was an antique altar. Here, just above, was a small bench, with a classical motto, denoting the excellence of the situation. From a retired spot on the left was seen, through an opening, a landscape of a distant hill, with a white farm-house upon the summit; and from the right a beautiful round slope, crowned with a clump of firs, with a pyramidal seat in its centre, to which the path led.

After another view of the priory, the visiter ascended to a small bench, where the circumjacent country began to open, showing a glass-house, resembling a distant pyramid, between two large clumps of trees, about four miles off. Ascending to the next seat, which was in the Gothic form, the scene grew more and more extended; woods and lawns, hills and valleys, thicket and plain, being agreeably intermingled. Here were written up some beautiful pastoral verses. Having read these, he passed through a wicket, and found the path leading up the back part of a circular hill, discovering little of the country, till he reached a clump of stately firs on the summit. Overarched by these firs was an octagonal seat, with a pedestal in the middle for a goblet, inscribed—

TO ALL FRIENDS ROUND THE WREKIN,

an old Shropshire health, in commemoration of his country friends, from which this part of Shropshire is divided. The Wrekin, a large and venerable hill, appeared full in front, about thirty miles off.

The scene from the octagonal seat was varied and fine, being divided by the firs into compartments, according to the octagonal position of view. A serpentine stream washed the foot of this hill, lost behind the trees at one end, and crossed by a bridge at the other. In one of the compartments was a view of a cottage, and a road winding behind a farm-house: in another the town was seen: in another the blue distant mountains were observed to skirt the horizon.

After seeing another landscape, the visiter wound his way through a small thicket, and entered a cavity in the hill, filled with trees. After viewing from hence the meandering stream, he ascended to a

kind of Gothic alcove, where was an inscription after the antique. Below was another sloping lawn, with hills in the distance. From hence, a hanging wood, with a wild heath, intersected by cross-roads, formed a conspicuous object. Here was a seat, whence the water was seen in its onward progress, or, as it was poetically observed, "the proprietor has taken the Naiad by the hand, and led her an irregular dance into the valley."

After entering upon another lawn, there was beyond it a new theatre of wild shaggy precipices and hanging coppice-ground, all of an opposite character to that already passed. In the centre of the hanging lawn, which was next seen, was the house, half hid with trees and bushes. Here wood and water were beautifully blended. In the distance Lord Stamford's grounds and the Clee hills were observable.

Mid a scene of hanging woods and wild declivities, the visiter then descended the valley, and obtained from the great lawn a view of the house and the top of Clunt hills. Many of the objects before noticed were then seen again in a different view.

> Drawn by the music of the groves,
> Along the winding gloom he roves,—

observing more epitaphs, and inscriptions in walks appropriately intituled. By continuing his walk, the visiter arrived at the temple of Pan, suitably dedicated. Leaving this, he arrived, by a shady walk, at a seat on a precipice, which formed a commanding terrace, for taking the whole in at one view; and after seeing this from two or three other points, he came to a handsome Gothic screen, backed with firs and a cascade. Soon after came an upward view of the valley, with the cascades and meandering stream. After seeing this and some other objects, a beautiful gloomy scene, called "Virgil's grove," attracted attention, with inscriptions to the poets Virgil and Thomson. Great pains were taken to give effect to every part of this grove, so that the poet,—the lover of nature,—might carry on his musings—

> At the fountains of a rill,
> Till contemplation had her fill.

From another seat was a calm and tranquil scene of water, stealing along through a rude sequestered vale; and a little further on, all sight of the water was abruptly lost, but the noise of it was heard: an effect which the Chinese are fond of producing in what they call their scenes of enchantment. A cascade, seen before at a distance, was then viewed near, with a grotto above it; before coming close to which, was a mineral spring, with an iron bowl for drinking. Then winding up a shady path on the left hand, and crossing the head of the cascade, the visiter approached the house through the shrubbery which enclosed it, where were some other seats with inscriptions to particular friends. From hence was an opening down the valley, over a large sloping-lawn, well edged with oaks, to a piece of water with a bridge. Hereabouts was a dovecote, a receptacle for gold fish, and a statue of Venus de Medici, with a poetical inscription.

But the poet's expenses in producing all these beautiful effects, had greatly exceeded his means, and impaired his fortune. An application was accordingly made to Lord Bute, to grant him a pension; but before the answer could be obtained, Shenstone was seized with a fever, which carried him off in February, 1763, in the forty-ninth year of his age. His works, of which the poem of *The Schoolmistress* may be considered the chief, were collected and published by Dodsley, in three volumes.

THE PENDULUM. No. I.

By a pendulum is meant any body *suspended* from a fixed point, (as is implied by the Latin word *pendeo*, to hang,) so that when once drawn aside, out of its natural position, and then left alone, it not only returns to its former position, but goes beyond it; and so continues to swing backwards and forwards, describing each time a smaller and smaller arc; till at length it rests in the position which it had before the disturbance. In order to understand why this happens, the reader must remember that when a body is once set in motion, it acquires a property called *momentum*,—by virtue of which it has a tendency to continue in motion; and therefore a certain degree of force is always required to stop such body; and, if this force be insufficient at first to stop the body, it will nevertheless act by degrees, and gradually retard the motion until it destroys it altogether. Thus, if a body be allowed to roll down an inclined plane, at the bottom of which there is an extended horizontal surface; the force of gravity, which pulls the body down, ceases to act as soon as the body arrives at the horizontal surface; yet, the body does not then stop at once, but continues to roll on to a certain distance, because it has, during its descent, acquired the impelling property which we called *momentum*, and it requires a certain *force* to overcome that momentum. If no such force were applied, the body would roll on for ever with undiminished speed, but there is a force which, even during its descent, is continually endeavouring to stop it: this is the *friction*, or rubbing, of the body against the surface over which it moves. This friction of the different parts of machines against each other, is a main cause of loss of power; and hence, the axles of wheels, &c., are made as smooth as possible; and the friction is still further diminished by oil or grease introduced between the rubbing surfaces. In the case of the body rolling down the inclined plane, when it arrives at the bottom, the friction is still not sufficient to stop it at once; but, as the force which originally moved it has ceased, while the force of friction continues undiminished, this latter force gradually overcomes the momentum of the body, until at last it entirely stops it.

Now, to apply this to the pendulum, when it is drawn aside, its centre of gravity must necessarily be raised, because the point of suspension acts as an axis, about which the whole pendulum moves; and therefore every point in the pendulum must describe part of a circle, whose centre is the point of suspension. The position naturally assumed by the mass or bob of the pendulum, is that in which its centre of gravity is immediately *below* the point of suspension, or in the lowest point of the circle in which it is free to move. It cannot be moved, therefore, without being raised *above* the level of its natural situation; and, of course, when left to itself, it has a tendency to descend to that level. But, when it has descended, it does not stop when the force of gravity ceases to act, *i. e.*, at the *lowest point*; but its momentum carries it beyond that point, in the same manner as the rolling body passed beyond the bottom of the inclined plane. In this case, the reader will imagine that, as the body, or mass of the pendulum, does not touch any surface, there is no friction, and consequently it ought to go on for ever. But, upon second thoughts, he will remember, from what was said before, that after the body has gained its natural position, it cannot move beyond it, without rising in opposition to the force of gravity; and, although this force is not sufficient, at first, to destroy the pendulum's motion, yet it gradually retards it, until, when the centre of gravity has risen to the level that it was raised to by the original force, its momen-

tum is entirely lost. The force of gravity then brings the pendulum-bob down again to its natural position, and also gives it enough momentum to carry it beyond that point, and up to the level from whence it descended, or the point to which it was originally drawn up. Thus, were these all the forces acting on the pendulum, it would, after being once set in motion, continue to swing, or *oscillate*, for ever. But there are various other causes which retard its motion; such as the *friction* of the axis or point of suspension, and the *resistance of the air.*

However delicately our machinery for suspending the pendulum may be constructed, we can never entirely get rid of the first of these causes of retardation; and, therefore, all real practical pendulums, after being set going, do not rise on the opposite side to a height *quite* so great as that which they descended from. Now, although, in a well-constructed pendulum, this difference will be too small to be sensible, yet the same cause which made the second oscillation less than the first, will make the third less than the second: thus, as every oscillation diminishes in length, they finally cease altogether, and the pendulum assumes its natural position of repose. These observations likewise apply to the resistance made to the motion of the pendulum by the air.

But, it is a remarkable fact, that, although the length of the oscillations continually diminishes, yet the time taken up by each oscillation remains the same. This may easily be proved by the reader. Suspend a piece of lead to the end of a piece of string having its upper end fixed, and set it oscillating like a pendulum. At first the oscillations may each be several inches in length. Now count the number made in any given time, as for instance, in a minute. After the lapse of some time, say five minutes, the oscillations will, of course, be each one very much diminished in extent; yet the number of oscillations made in a minute, in this latter case, will be found to be the same as in the former. This may, at first, seem paradoxical; but the reason is, that the pendulum always moves slower in proportion as its oscillations are shorter; so that the shortest oscillations take up as much time as the longest.

This extraordinary and truly invaluable property of the pendulum, is called *isochronism*, a word which, like all our modern scientific terms, is made up of two Greek words, and implies *equal timedness*. It is on this most invaluable property that all the utility of the pendulum as a time-measurer depends. It was first applied to this purpose by Galileo, who lived at the latter end of the sixteenth, and the beginning of the seventeenth centuries, and it is said that he was first led to examine the laws of the pendulum, by observing when very young, a chandelier suspended from the roof of a church at Pisa, in Italy, which, owing to the wind or some accidental cause, was swinging to and fro like a pendulum. When he afterwards, for astronomical purposes, wished for a time-keeper which might exceed in accuracy those then in use, he used a pendulum, at first employing people to count its oscillations; but afterwards making a pendulum register its own oscillations, by an appropriate combination of wheels driven round by a weight, which was suffered to fall through only a certain small space during each oscillation. Such a machine is called a CLOCK. But this is said to have been done by Justus Berge, a Swiss, in the year 1552. There is also an account of one Richard Harris, an Englishman, who in 1641, made the first pendulum-clock for the old St. Paul's Church in Covent Garden. Galileo, it is therefore asserted, only discovered the isochronous *property of the* pendulum in 1633.

Let us now examine on what conditions the time taken up by a pendulum in oscillating depends. It has already been seen that the length of the oscillations has no effect in altering their time; for the increased length is compensated for by the increased velocity. Thus the same pendulum always oscillates in the same time, whether its oscillations be long or short.

The reader may imagine that it is the *weight* of the bob of the pendulum that produces the difference of time between different pendulums; but he will find on trial that this is not the case. To prove it let him fix two balls of lead very unequal in weight, to two strings of equal length, and having suspended them, set them going together. He will find that the oscillations of the one will diminish in extent much sooner than those of the other; but yet the two pendulums will make the same number of oscillations in any given time (say a minute). This may at first seem strange; for the force of gravity acts, of course, with more power on a heavy than on a light body; and therefore, the former ought to fall more quickly, and consequently, to oscillate more quickly, when suspended as a pendulum. But neither of these is found to be the case: a cannon-ball and a small bullet, let fall from a height at the same time, will reach the ground together. The reason is that the cannon-ball is more powerfully acted on by gravity, yet there is a greater quantity of matter to be moved; and therefore more *inertia* * to be overcome; and more power is therefore required to move the cannon-ball than to move the bullet through the same space. For the same reason, if they be suspended to strings of equal length, they will oscillate as pendulums in equal times.

What is it, then, (the reader will ask,) that makes the difference between a seconds' and a half-seconds' pendulum? We cannot produce the change by altering the weight of the bob, or by lessening the extent of the oscillations, or by suspending the pendulum in any peculiar manner. The answer is, that it is the *length* of the pendulum-string that can have any effect on its time of oscillation. Accordingly you will find that by increasing the length of the string of your pendulum, you will increase the time taken up by one oscillation; "the times of the oscillations of different pendulums being in the proportion of the *square roots* of the lengths of their strings."

Fig. 1.

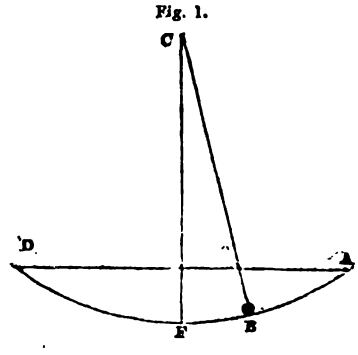
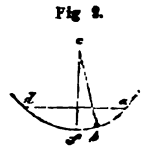


Fig 2.



Let two pendulum-bobs B, *b*, be suspended from two points C, *c*, by strings C, B, *c*, *b*, which are to each other, say, as 4 to 1.

These arcs are *similar*, because they are to one another as their radii C, B, *c*, *b*: and F *f* are the *lowest points*, mentioned before, or points of repose. The distances A, D and *a*, *d*, constitute the *times of the oscillations* respectively; which will be in the proportion of the square root of C, B to the square root of *c*, *b*, or as 2 to 1.

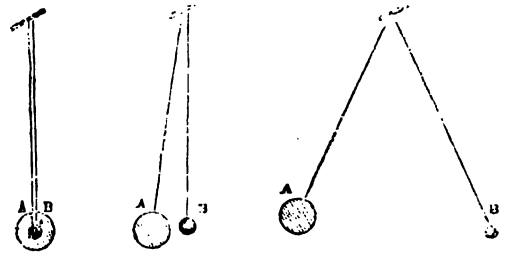
Therefore in the annexed figure, let C, A, be four

Fig. 3.

times as long as C, B, and let both the pendulums oscillate. Then, it will be found, by counting the number of oscillations made by each in a given time, that A takes twice the time to oscillate that B does; or that B oscillates twice while A oscillates once. A may therefore be considered to be a pendulum beating seconds, and B one which beats half-seconds.

When, however, the difference in the length of string is but slight, the difference of time may not be perceptible in one oscillation; but it will be necessary to combine several oscillations (sometimes many thousands) in order to perceive the difference. Thus, if you have two pendulums you may count the number of oscillations made by each in a minute; and if that space of time be not long enough to show the difference, try a quarter of an hour, or even an hour. Or a still better method is to suspend one pendulum right in front of the other and set them going together. For a short time they will appear to keep together as in this figure.

Fig. 4. Fig. 5. Fig. 6.



But the one which has the shorter string must necessarily gain little upon the other at each oscillation so that they gradually separate from each other as in fig. 5. This separation goes on increasing until they are separated as widely as possible, as in fig. 6. The quicker pendulum has now gained upon the slower by a whole oscillation; and they cross at the lowest point of the arc. After this has gone on a few times, the distance between them begins sensibly to diminish, till at last they seem for a few oscillations to keep together again, as in fig. 4. They soon, however, begin again to separate, and go on till they get to their widest separation, as in fig. 6; and then they begin again to approach each other. Now this will go on for any length of time; and a little reflection will soon convince us, that, whenever they appear in the position of fig. 6, the quicker pendulum has gained on the slower by 1, 3, 5, or some *odd* number of oscillations; but, whenever they appear like fig. 4, the difference between them is 0, 2, 4, or some *even* number of oscillations.

Now, suppose it is found that, after 100 oscillations of the slower pendulum, they are separated by their widest interval, as in fig. 6:—then, of course, the quicker pendulum has oscillated 101 times in order to gain 1 oscillation upon the slower. Then, after 200 oscillations of the slower pendulum, or 202 of the quicker, they will again seem to hang together, as in fig. 4; after 300 oscillations of the slower, or 303 of the quicker pendulum, they will again be separate, like fig. 6; and again, after 400 and 404 oscillations respectively, they will once more coincide, like fig. 4: and so on. In this case, therefore, although we cannot, by our senses, perceive any difference between the times of *single* oscillations in each pendulum, yet, by combining the effect of *several* oscillations, the difference becomes evident; viz., that the shorter pendulum makes 101 oscillations, while the longer is making 100; so that one oscillation of the shorter pendulum is equal to $\frac{1}{101}$ of one oscillation of the longer. If the longer vibrate seconds, the shorter vibrates once in $\frac{1}{101}$ of a second.

A method such as this has been profitably employed in estimating the force of gravity at different parts of the earth's surface. In an Astronomical Supplement, No. 401 of this work, we pointed out to our readers that the earth was not strictly *globular*, but that it bulged out at the equator, and was compressed at the poles;—a consequence of its diurnal motion. Now the centre of gravity must necessarily coincide with the centre of the terrestrial mass, and the attraction of gravitation is strongest towards the centre. A person on the equator is 27 miles farther from the centre of the earth, than a person would be at either pole; and this distance varies in a corresponding ratio at every degree of latitude between the poles and the equator. It follows, therefore, as is actually found to be the fact, that the pendulum is less influenced by the gravitating force at the equator, than at any other point, north or south of it. It does not, therefore, at the equator beat so fast, supposing no alteration to be made in the string, as in higher latitudes, and must therefore be shortened: whereas, in the Polar regions it beats faster than it does with us, and requires to be lengthened; for the force of gravity makes the pendulum move more quickly, or seek more earnestly, as it were, to reach its *point of repose*. The seconds' pendulum for the latitude of London, must have a string 39·139 inches long. The length of this string, if this pendulum be taken to the equator, must be altered or 39·012 inches; and if taken to either pole, it must be lengthened to 39·22 inches.

* This is a Latin word, implying *inactivity*, and is used to denote that state of rest, in which matter has a tendency to remain, when unacted upon by an extraneous force.

THE JEWS.

II.—The Dispersion.

"I look upon that people," says Bishop Watson, speaking of the Jews, "with astonishment and reverence: they are living proofs of facts most ancient and most interesting to mankind. Wherever we have a Jew on the surface of the earth, there we have a man whose testimony and whose conduct connect the present time with the beginning of all time." Though divided and dispersed over the whole habitable globe, yet no change of climate, no adaptation of modes of life of the people with whom they may sojourn, removes the stamp of their origin from their features, or loosens the bond of union which connects the whole Jewish race to one grand interest, and feeds them with an intensely nursed hope. The prophecy which predicted that they should be scattered over the world, and yet not find a home, has been visibly fulfilled; but the promise of their restoration, which they so earnestly look for, it is, that has kept the entire race in close and uninterrupted communication with each other, during the whole of the Christian era.

Long before the destruction of Jerusalem in the year 70,—from which the general dispersion of Israel is dated,—the Jews had distributed themselves over other countries. After the Babylonish captivity, many of them remained in Mesopotamia; and colonies of Hebrews had been formed in various other parts of Asia, in Egypt, Cyprus, and Cyrene; but the total overthrow of their city by the Romans, fulfilled the prophecy of that punishment which was to follow their rejection of the Saviour.

The total number of Jews existing at present has been stated at 6 000 000; of which 80 000 are said to

reside in the Turkish dominions; but in Persia, oppression and exaction have reduced them to a small number; and only a few reside in Tartary, Afghanistan, and India; while the contiguous countries of Moravia, Ancient Poland, Crimea, Moldavia, and Wallachia, have been vaguely estimated to contain 3,000,000, or one half of the entire Hebrew population, Russia and Poland containing 1,700,000. In France and Italy the Jews are estimated at 86,000; in Austria, 520,000; in the German Empire, 273,000; in Great Britain, 30,000; and in the United States there are only 5,000.

The Jews of the *Eastern world* have the same distaste for agriculture (traced by the learned to the oppressions of the shepherd kings of ancient Egypt,) as their brethren of the West: hence their unsettled state. In Georgia, however, a few cultivate the soil; but in Yemen they imitate the Arab mode of life. In Persia they are so miserably oppressed that they frequently fly to the despotism of Turkey, as the more endurable. At Constantinople, the Jews are almost exclusively employed in traffic, many of whom, it is said, have been converted to Christianity. The headquarters of the Eastern Jews is Grand Cairo, where they reside in a part of the city especially allotted to them, and which is miserably close and dirty, and intersected by lanes so narrow as hardly to admit of two persons passing in them. Yet their affection for this wretched quarter is excessive. M. Mengin relates an amusing anecdote illustrative of this:—he once met an Egyptian Jewess in Paris, none of the beauties of which could console her for the loss of the filthy Caireen Jews' quarter. "Alas," she exclaimed, in accents of regret, "where is Cairo—where the quarter of the Jews?"

The treatment of the Egyptian Hebrews may be taken as a fair sample of their condition in other parts of the East. Lane, in his *Modern Egyptians*, gives the following account of them:—

> They are held in the utmost contempt and abhorrence by Mooslims in general; and are said to bear a more inveterate hatred than any other people to the Mooslims and Mohammedan religion; but they lead a quiet life. Avarice is more particularly the characteristic of the Jews of Egypt than of those of other countries, where they are less oppressed. They are careful, by every means in their power, to avoid the suspicion of being possessed of much wealth. It is for this reason that they make so shabby a figure in public and neglect the exterior appearance of their houses. The condition of the lower orders is very wretched, many having no other means of subsistence than alms bestowed upon them by their superiors of the same sect.

Some of the Egyptian Jews are money-changers; others are goldsmiths, or follow retail trades; but the more wealthy are general merchants.

The Jews on the other side of the Isthmus of Suez are numerous, and many are fast flocking to Jerusalem from every quarter of the globe; but as we intend to devote a separate article to these, we shall for the present dismiss the Eastern Jews, by merely stating one or two remarkable circumstances regarding them. From Dr. Wolff, the converted Jew missionary, we learn that at Mosûl, near the site of ancient Nineveh, the Hebrews have their colleges; in one of which is deposited a manuscript of the New Testament in Arabic, but written in Hebrew characters; the translator was a Rabbi now dead, but whose son lived there in 1828. Mr. Wolff found it to be a good translation; and the Rabbi had written in it *a recommendation to peruse it, addressed to the members of the colleges.* At Ispahan, the missionary was not only allowed to preach the Gospel to the Jews, but was listened to attentively, and maintained by them when his funds *were exhausted.*

It is no slight evidence of the strictly literal fulfilment of the prophecy, that they should be found in every corner of the earth, that many of them, for ages, have been established in China,—a country which, abhorring the foreigner, seems to have made an exception to a rooted prejudice in favour of the children of Israel. Abyssinia—a country the exploration of which has cost so many enterprising Christian travellers their lives—has always been open to the Jews; a powerful colony of whom (which at one time actually reigned over the kingdom) still exists there. Barbary and the Malabar coast have also their Jewish inhabitants.

In the *Western world*, little appears to be known of their condition for some time after the fall of Jerusalem. The first body of Israelites which attracted attention were those of Spain, from whom rabbinical learning chiefly descends; but under the terrors of the Inquisition, they were driven to assume the mask of Christianity. There are at Salonica thirty synagogues, and about 25,000 professed Jews.

The most permanent settlement the Jews ever made was in Poland, which became, in the middle ages, the seat of rabbinical learning. This colony obtained considerable privileges from Casimir the Great, who married the beautiful Jewess Esther. Of late years, the Hebrew race literally swarmed in Poland, where they were largely engaged in every employment but that of agriculture; and even at the extinction of that unhappy kingdom as a nation, they remained in that portion of the Russian empire. No inconsiderable number, however, took their departure for Jerusalem, which they have already begun to call "home." The government of Russia have lately shown some anxiety concerning the Jews; and in 1825 a committee was formed to ameliorate their condition, and an institution for the education of Rabbis and schoolmasters was established; and in 1828, regular teachers of Hebrew, German, Polish, history, geography, mathematics, and rabbinical learning commenced their labours. In consequence of this measure, Jewish schools are to be found throughout the empire, particularly in Poland, in all which the children of poor parents are educated gratis; while those who can afford the expense are obliged to pay.

But this advantage is more than counterbalanced by the oppressions and exactions which still press upon the Jews resident in Russia.

> They are driven from place to place, and not permitted to live in the same street where the so-called Christians reside! It not unfrequently happens that when one or more wealthy Jews have built commodious houses in any part of a town, not hitherto prohibited, this affords a reason for proscribing them; it is immediately enacted that no Jew must live in that part of the city, and they are forthwith driven from their houses, without any compensation for their loss being given*.

In spite of the terrible persecutions inflicted on the Jews, in popish times, throughout the German *empire*, they have recently enjoyed many privileges. Some of them have served in the army with distinction, and others have risen to opulence, and have been celebrated for their benevolence. A few of the German states are not so tolerant as others: a curious anecdote is told, which forcibly illustrates benevolence on the one hand, and intolerance on the other. About sixty years ago, a Jew subscribed largely to the rebuilding of a small town in the north of Germany, which had been burnt down; a year or two later, arriving at its gates, he was stopped at them by a law of the place, forbidding the entry of an Israelite.

The Italian Jews are chiefly at Leghorn and Genoa; and there are 4,000 residing at Rome. In Holland

* HERSCHEL'S *Brief Sketch*, (1837) p. 7.

and Belgium they are also numerous. The Jews of France chiefly abound at Metz, along the Rhine, and at Marseilles and Bordeaux; and were in Buonaparte's time considered of such importance, as to have been deemed worthy of being especially propitiated; and he called a congress of them together under the name of Great Shanderim; from that time the Jews have enjoyed the same privileges as other Frenchmen.

We now come to the Jews settled in the British empire, whose expulsion in 1279 is a blot in the page of history, which they, in remembrance of their wrongs, seem in no hurry to forget; for in their almanac for this very year, that event is pretty significantly noted in black letter. They did not regain a footing in England till the time of Cromwell, and then not without very considerable opposition from the fanatics of the time. In 1752, we find some laudable attempts made in Parliament to remove the most pressing disabilities under which our Israelitish brethren laboured. On this occasion, also, the Naturalization Bill was strongly opposed, and a fire of pamphlets was vigorously kept up against it. From one of these we make a humorous extract, premising that the Jews claimed some consideration from having been very active in quelling the Pretender's insurrection:—

When the constitution was in danger, in the year 1745, then the heroic Jews raised all Duke's Place; they mustered, marched out, and took the field; they raised money—imported specie—filled royal coffers—preserved our sinking credit—and saved the Bank. All this the Jews did, which when the ragged crew heard at Derby, they fled from these intrepid Jews, like so many frightened sheep from a troop of wolves, and never stopped until they received intelligence that the Jews' army was returned to its head-quarters in Duke's Place*.

Of late years, a spirit far more creditable to the feelings of Englishmen has sprung up and removed much of the odium unjustly attached to the Jewish character. Their political and social condition has, in consequence, become improved, and we can now offer them an asylum where they may enjoy a greater degree of civil and religious liberty than in any other civilised country. But the Hebrews of foreign nations are averse to change: for the whole race is anxiously looking forward to that day when they shall be "gathered unto the home of their fathers."

We will conclude with a word or two on some of the different sects of Judaism. The most remarkable of these are the Careites, who principally reside in the Russian empire, and are objects of great dislike to the Rabbinical Jews; for they abide strictly by the written law, rejecting much of the Talmud. Dr. Clarke learnt from one of them, that their schism is old as the return from the Babylonish captivity. The Zoharites and Chasidim regard the Zohar (a rabbinical work dating from the first century of Christianity) as their chief religious book; and principally abound in the Russian-Polish provinces. They are stigmatised as great fanatics. The Rechabites are Arab Jews; and profess pure Judaism. They possess the Pentateuch, and other books of Holy Writ; and though they usually speak Arabic, they all know Hebrew. Dr. Wolff found Samaritans to the amount of about fifty families, at Sychem, at the foot of Mount Gerizim; they expect the Messiah, and have been accused of worshipping the dove of Noah: but, in truth, they only regard it as a symbol. The Rabbinical Jews are modern representatives of the scribes and lawyers of the time of the Saviour.

* *An Answer to a Pamphlet entitled "Considerations on a Bill for the Naturalisation of the Jews."*

ENGLAND IN THE OLDEN TIME.

X.

Minstrels, Jugglers, and Dancers. 2.

In our last article on this subject, we brought down our notice to about the beginning of the fourteenth century. We now proceed to later dates.

Minstrels seem to have acquired some note in the reign of Edward the Fourth; for it was stated, that certain rude husbandmen and artificers of various trades had assumed the title and livery of the king's minstrels, and, under that colour and pretence, had collected money in divers parts of the kingdom, and committed other disorders. The king, therefore, granted to Walter Haliday, marshal, and to seven others his own minstrels, named by him, a charter, by which he created, or rather restored, a fraternity or perpetual guild, of minstrels, to be governed by a marshal appointed for life, and two wardens, who were empowered to admit members into the guild, and to regulate and govern, and to punish, when necessary, all such as exercised the profession of minstrels throughout the kingdom.

The rewards given to minstrels did not always consist of money, but frequently of rich mantles and embroidered vestments; the nobles would sometimes give them even the robes with which they were clothed. The minstrels took care to carry these robes with them from place to place, in order to excite similar liberality in other persons. Another scheme of theirs was, to make the heroes of their poems exceedingly bountiful to minstrels, who appear to have been introduced into the poems expressly for that purpose.

In the chronicles of several kings of England are numerous entries of wages and gratuities to minstrels; such as "A present of five shillings made by the king to a minstrel, for performing his minstrelsy before the image of the blessed Virgin;"—"Forty shillings for exhibiting before the king at Hatfield;"—"Pudesey the piper received six shillings and eight pence from the king, for his performance;"—"Fifteen shillings to a stryng-minstrel, for one moneth's wages;"—"To a strange taberer, in reward, sixty-six shillings and eight pence," &c.

The jugglers, or tregetours, became very famous in the fourteenth century. In an old poem, Death is represented as addressing himself to persons of all ranks and ages, and among others, to a famous tregetour of the reign of Henry the Fifth, in the following words:—

Maister John Rykell, sometime tregitour
Of noble Henry, kinge of Englonde,
And of France the mighty conqueror;
For all the sleightes, and turnyng of thyne hande
Thou must come nere this dance I understonde;

Nought may avail all thy conclusions,
For Dethe shortly, nother on see nor lond,
Is not desceyved by no illusions.

In another ballad or poem there is an allusion to a feat which seems to have resembled a trick of modern times, in which a knife or a piece of string appears as if it were drawn through the nose, or through the hand:—

What juggling was there upon the boardes!
What thrustyng of knyves through many a nose!
What bearynge of forms! what holdynge of swordes!
What puttynge of botkyns throughe legge and hose!

Among other feats of the jugglers of those days, was that which has since been called *rope-dancing*. A singular example of this has been described by Froissart, as having occurred upon the public entry into Paris of Isabel of Bavaria, queen to Charles the Sixth:—"There was a mayster came out of Geane; he had tied a corde upon the hyghest house in the brydge of Saynt Michel over all the houses, and other ende was tyed to the hyghest tower of our Ladye's churche; and, as the quene passed by, and was in the great streat called our Ladye's streat; bycause it was late, this sayd mayster wyth two brinnynge candelles in hys handes issued out of a littel stage that he had made on the heyght of our Lady's tower, syngynge as he went upon the cord all alonge the grete strete, so that all that sawe him hadde marvaylle how it myght be: and he bore still in hys handes the two brinnynge candelles, so that he myght be well sene all over Parys, and two myles without the city. He was such a tombler, that his lightnesse was greatly praised." Some doubts have been expressed as to whether he ran or slid down the rope.

A performance somewhat similar was exhibited at the coronation of King Edward the Sixth, while the procession was passing through the city. It is thus described by an old author:—"When the king was advanced almost to St. Gregory's church, in Paul's church-yard, there was a rope as great as the cable of a ship, stretched in length from the battlements of Paul's steeple, with a great anchor at one end fastened a little before the Dean of Paul's house-gate; and, when his majesty approached near the same, there came a man, a stranger, being a native of Arragon, lying on the rope, his head forward, casting his arms and legs abroad, running on his breast on the rope from the battlements to the ground, as if it had been an arrow out of a bow, and stayed on the ground. Then he came to the king's majesty, and kissed his foot; and so, after certain words to his highness, he departed from him again, and went upwards upon the rope till he came over the midst of the church-yard; where he, having a rope about him, played certain mysteries on the rope, as tumbling, and casting one leg from another. Then took he the rope, and tied it to the cable, and tied himself by the right leg a little space beneath the wrist of the foot, and hung by one leg a certain space, and after recovered himself again with the said rope, and unknit the knot, and came down again, which stayed his majesty, with all the train, a good space of time."

Among other exhibitions by itinerant jugglers were imitations of animals, which they effected by clothing themselves in skins of animals and other trappings, as in the above cut. A drawing in an old MS. presents us with a representation of a stag; another, that of a goat walking erect on his hinder feet. Neither of these fictitious animals have any fore legs; but to the first, the deficiency is supplied by a staff, upon which the actor might recline at pleasure; his *face is seen through* an aperture on the breast of the sham animal; and it is probable that the person chosen to play this character had a face susceptible of much grimace, which he had an opportunity of exhibiting to the best advantage, with a certainty of commanding the plaudits of his beholders. In another drawing is a boy, with a mask resembling the head of a dog, presenting a scroll of parchment to his master. There are two other boys following the first, disguised in a similar manner, and each holding a similar scroll of parchment.

Jumping and vaulting formed also part of the feats of the times. The annexed cut, taken from an old MS., represents the exploit of jumping through a hoop: others jumped through the head of a drum.

Laneham speaks of an Italian who showed his agility in "goings, turnings, tumblings, castings, hops, jumps, leaps, skips, springs, sarabands, somersaults, caprettings, and flightes, forward, backward, sideways, downward, upward, and with sundry windings, gyrings, and circumflections; insomuch that I began to doubt whether he was a man or a spirit: I cannot tell what to make of him; save that I *may* guess his back to be metalled like a lamprey, that has no bone, but a line like a lute-string."

This last-mentioned exhibiter seems to have belonged to the class of *posture-masters*, of whom there are representations as far back as the reign of Edward the Third. One of these, in the reign of Charles the Second, although a well-made man, had the knack of distorting himself in all sorts of ways. "I remember," says a writer of the period, "a very whimsical fellow, commonly known by the name of the *poster-master*, who was the plague of all the tailors about town. He would send to one of them to take measure of him; but would so contrive it as to have a most immoderate rising in one of his shoulders: when his clothes were brought home, and tried upon him, the deformity was removed into the other shoulder; upon which the tailor begged pardon for the mistake, and mended it as fast as he could; but, on another trial, found him as straight-shouldered a man as one would desire to see, but a little unfortunate in a hump-back. In short, this wandering tumor puzzled all the workmen about town, who found it impossible to accommodate so changeable a customer."

By the time to which we have now arrived, *viz.*, about the sixteenth or seventeenth centuries, the minstrels, or those exhibiters who made music and poetry the object of their attention, had fallen to a very low ebb, and no longer merit notice. There are, however, other branches of the juggler's or exhibiter's art, which deserve to be traced through the next few reigns, as examples of the amusements in England in the time of our forefathers. These we shall consider in another article.

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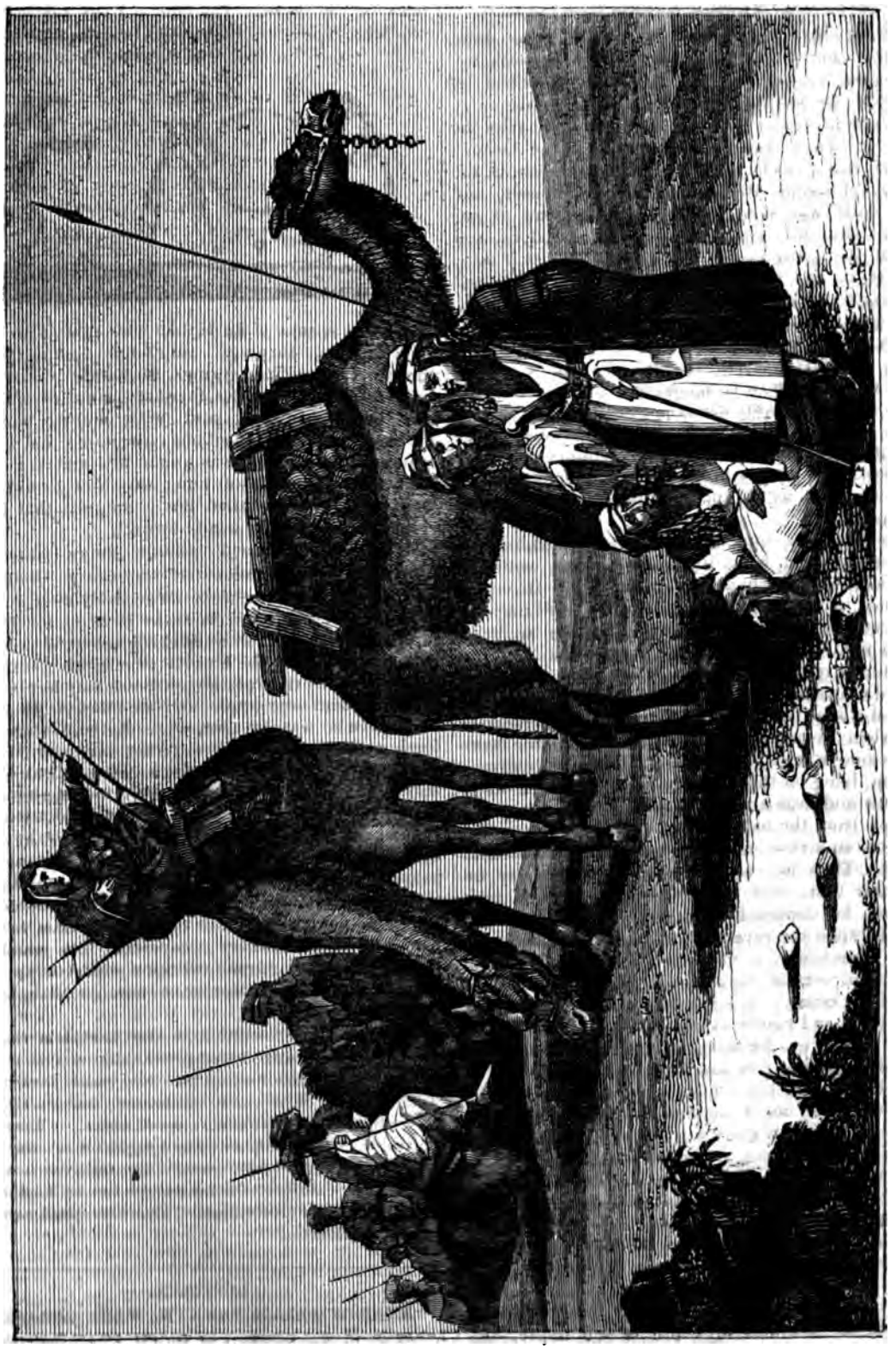


ARABS OF THE DESERT.

THE ARABS OF THE DESERT.

IN the wild and trackless regions of the Arabian desert, in that barren land where no other human beings could long exist; without fixed habitations, without any of those comforts which we are accustomed to consider as necessary to the enjoyment of life, dwell the wandering lawless tribes, the descendants of Ishmael. For more than 3700 years, they have inhabited the wilderness where Ishmael dwelt; and have displayed throughout that long period, the striking resemblance which they bear, in character and condition, to their progenitor, of whom it was declared, previously to his birth, "He will be a wild man; his hand will be against every man, and every man's hand against him." The history and manner of life of these people, when compared with the prophecies concerning Ishmael and his descendants, afford a remarkable instance of the fulfilment of Scriptural predictions.

The migratory tribes of Bedouin Arabs have never been subjugated by foreign conquerors. Sesostris, Cyrus, Pompey, Trajan, and other sovereigns, have attempted to subdue them; but though they gained some short-lived triumphs over detached tribes, they were ultimately obliged to abandon their undertaking, owing to the very nature of the country, which is on three sides surrounded by the sea, and cannot be made to harbour a foreign invading force, or supply it with the commonest necessaries of existence.

When any tribe of Arabs is attacked by a foreign enemy, all the neighbouring chiefs will unite in the common cause; and though they are not without internal discord, or free from the evils of warfare among themselves, yet in a time of danger which threatens the whole community, they speedily forget their differences, and join in valorously resisting the aggressions of their foe. They value their freedom above every other consideration; and all the allurements of wealth and luxury are unable to win them from their primitive mode of life and government. Those who reside in towns, or very near the sea-coast, have in some measure lost their original character; but the true Arab is always a dweller in tents, and a wanderer, from one generation to another. Their nobles are called *sheiks*, and bear absolute rule over their families and servants. If unable to defend their dependants and property from the attacks of some hostile neighbour, several petty sheiks unite, and choose a chief from among themselves. The sheik receives no yearly income from his subjects, but is, on the contrary, obliged to seek their favour by presents, and by acts of hospitality towards strangers. The means by which he is enabled to defray these expenses, are the sums which he levies in tribute or plunder, or obtains from the pilgrim-caravans. Mounted on his horse, or on a dromedary, he goes every day to inspect his subjects, to visit his friends, or to indulge in the pleasures of the chase. His repast is of the most simple description: a large wooden dish, filled with boiled rice, is served up for him and his friends; and one party after another sits down to partake of it, till the dish is emptied, or the company satisfied.

From their habits of life, and constant exposure to the air, the Arabs acquire a wonderful power of discerning distant objects, as well as of hearing sounds, which to persons with less accustomed eyes and ears, is quite astonishing. Their sense of smelling, too, is extremely quick, and easily offended: hence their dislike of houses and towns, where the exhalations from the crowded habitations fill them with disgust. They have also a most singular faculty of distinguishing the footsteps of men and animals on the sand. By observing the faintness or depth of the impression, and the intervals between each step, an Arab judges with surprising accuracy, as to whether the individual carried a load or not, whether he was fatigued, and whether it would be possible to overtake him. He can distinguish with equal facility the footmarks of camels: being able to track his own camel in a sandy valley where thousands of other footsteps mark the road in all directions.

The tents of the Bedouins are made of coarse dark-coloured cloth, extended over seven or nine poles fixed in the ground, the middle pole being the highest. In the larger ones, there are two or three compartments for the separate use of the men, women, and domestic animals. The furniture consists merely of a straw mat, which answers the purpose of table, chairs, and bedstead; and of a few articles of kitchen use which are very simple and portable. The pots are made of tinned copper; the dishes of the same material, or of wood. They have neither spoons, nor knives and forks. A round piece of leather serves them for a table-cloth, and in this they preserve the remains of the meal. Water is kept in goat-skins; and butter, which easily dissolves in that climate, in leathern bottles. A copper cup, carefully tinned over, serves for a drinking vessel. All their grain is ground in a small hand-mill. The cordial hospitality of primitive times still continues to be exercised by the Bedouins. They are ever ready to divide their scanty meal with the hungry wanderer; and there is even a generous rivalry among them, as to who shall have the honour of calling him his guest: that distinction being claimed by the Arab who first descried his approach. The hours of hospitality are, however, numbered: for three days and eight hours the stranger is considered as a ward; food is provided for him; his person is considered sacred; and he may fully confide in the fidelity of his host, after having eaten bread and salt under the covering of his tent. If his stay be prolonged, however, beyond the term mentioned, he is a simple visiter, and is expected to assist in the domestic affairs of the tent, such as fetching water, milking the camel, or feeding the horse. Should he refuse to do this, he is even then permitted to remain; but he is reproached with ingratitude, and soon finds it pleasanter to remove to another tent, where he will meet with a fresh welcome, and ready entertainment.

In the journeys of the Arabs through the desert, and in the removal of their tents, their families, and furniture, how indispensable to them is the patient camel! Justly do they esteem this animal as one of the most precious gifts of Providence; and very appropriately have they named it the "Living Ship of the Desert;" for without its aid, it would be impossible for them to traverse the wide oceans of sand with which their country is covered. The camel does not attain its full growth till the age of twelve years, though it is fit for use at a much earlier period. It will live as long as forty years, but loses much of its activity by the time it is thirty, and is then no longer capable of enduring great fatigue.

The expense of maintaining these valuable creatures is remarkably small: during a long journey through the desert, a cake of barley, a few dates, or a handful of beans, will suffice them, in addition to the hard and prickly shrubs they sometimes meet with by the way. These shrubs, which are so thorny and sharp as to be extremely distressing to travellers, and which no other animal would venture to touch, are so far from having been made in vain, that they constitute the nourishment and delight of the camel, whose teeth are so peculiarly formed as to enable him to chew such prickly food with comfort. But, whether his sustenance be of the coarsest or softest kind, the camel is

equally prepared to enjoy it; for his upper lip being divided, he is enabled to nip off the tender shoots, and turn them into his mouth with the greatest facility. The young and fresh leaves of the acacia trees are peculiarly grateful to him; and the Bedouins spread mats under these trees, and beat the boughs for a supply of food from thence for their camels. The chief services for which camels are employed, are riding and carriage. The term *deloul*, is applied to those which are trained for the saddle; and they are generally very docile, and travel at an easy, pleasant pace. In the province of Hejaz, the Arab women use a kind of palanquin, having a seat placed across the saddle, with cross-bars above, over which mats or carpets are spread to screen the traveller from the sun. The Bedouin never sets out on a long journey without examining the hump of his camel. If it be large, he is well assured of the animal's power to endure fatigue and hunger; but if it be the contrary, he knows that his camel will soon give way under his load, and become unfit for further exertion. A long journey will cause the hump almost entirely to disappear; but rest and nourishment soon restore it.

The most celebrated animal of Arabia, however, is the horse; and there, that noble quadruped may certainly be found in the greatest perfection. The Arabs bestow on it a great degree of care and affection, not only on account of its great utility, but because they have a notion that it is endowed with intelligence above all other creatures, and that it is the peculiar favourite of Heaven. Their prophet Mohammed is said to have thus related to them his own account of the creation of this animal.

When God wished to create the horse, he called the south-wind, and said, "I desire to draw from out of thee a new being; condense thyself by parting with thy fluidity,"—and He was obeyed. "Thou shalt be for man," He said, "a source of happiness and wealth; he will render himself illustrious by ascending thee."

These animals are generally of a middle size, light and active, slender, and delicately formed, of surprising swiftness, and capable of bearing great fatigue, and of a gentleness of disposition which makes them easily manageable, even by women and children. Their owners are particular in tracing their pedigree, which is often written out, enclosed in a leathern bag, and suspended round the animal's neck.

The Bedouins seem quite ignorant of the tricks which are practised by Europeans in the sale of horses, and are careful to give an exact and true account of the qualities of the animal, from a belief that they and their families would be subjected to a curse, were they to use deceit in so important a matter. A stranger may, therefore, purchase from them, and take their word with a degree of confidence which he knows it is impossible to place in his European brethren, accustomed as they unhappily are to swerve more or less from truth, in bargains of this nature.

It is a real grief to an Arab to be obliged to sell his horse. The animal has been so often fondled and caressed by the whole family, and is on such affectionate terms with them, that they almost cease to consider him of an inferior nature to their own; but address him in the language of endearment, and tell him of their joys and sorrows. The love and care bestowed on their horses is an amiable feature in the Arab character, and one which perhaps is more generally known than any other, on account of the numerous anecdotes which are commonly told to illustrate it.

But we must not suppose that this pleasing trait, united with that of their hospitality towards strangers, (which latter virtue would seem to be sometimes practised through pride, and through fear of the disgrace which attends the neglect of that ancient custom,) is indicative of general kindness of disposition, and gentleness of character in these wandering tribes. Their system of plunder, not only of strangers, but of their own fraternity, contradicts such an idea; while their quickness to take offence is such, that the slightest expression of contempt can only be expiated by the blood of the offender.

Their qualities are of a very contradictory nature; they are fierce and revengeful, yet they are not strangers to pity and gratitude; they are addicted to low vices, and yet very jealous of their honour. Their religion is a mixture of fanaticism and infidelity, and has little hold on its professors, beyond a few outward observances.

TRUTH.

Upon this wonderful and glorious ALL
I look, and see, there's nought destroyed, or lost,
Though all things change. The rain-drops gently fall,
But die not where they fall. Some part doth post
Swiftly away on wings of air, to accost
The summer clouds, and ask to sail the deep
With them, as vapoury travellers, or frost.
Some part anon into the ground doth creep,
And maketh the sweet herbs and flowers to grow,
Or oozeth softly through the dark, deep earth,
Teaching the streamlet under ground to flow,
Till forth it breaks with a glad sunshine birth—
Ripples a dancing brook—then flows a river—
Then mingles with the sea, the air, circling for ever.

Even so I looked on the vast realm of Truth,
And saw it filled with spirit, life, and power;
Nought TRUE did ever die. Immortal youth
Filled it with balmy odours; from the hour
It first dropped gently from its upper shower
On high, swiftly it flew away, or sank.
Awhile amid the darkness that doth lower
Below, it seemed to struggle. But earth drank
The drop. From heart to wakening heart it sped—
From sire to son—from age to age it ran;
It swelled the stream of Truth. It is not dead,
But flowing, filleth every want of man.
It NEVER dieth—nor *can* ever die,
Circling from God to God, through all eternity!

Yea, Truth, immortal as its primal source,
Once uttered, once set free, shall never rest.
O, Father! hath it such undying force
When unrevealed, and left without attest
Of miracle from Thee, and unconfessed
By man; and shall not Thine own WORD go forth,
In all its fulness, through these times unblest,
Till it shall reach all corners of the earth?
If one small trembling drop is ne'er destroyed,
But runneth, a bright messenger from Thee,
Shall Thy own living streams 'return back void,'
And not fulfil their saving ministry?
O, no! Even now I see them spreading wide,
With life and beauty, on the pure, deep, swelling tide!

C. P. CRANCH.

THE profoundly wise do not declaim against superficial knowledge in others, so much as the profoundly ignorant; on the contrary, they would rather assist it with their advice than overwhelm it with their contempt; for they know that there was a period when even a Bacon or a Newton were superficial; and that he who has a little knowledge is far *more* likely to get more than he that has none.—C.

THOUGH sometimes small evils, like invisible insects, inflict pain, and a single hair may stop a vast machine, yet the chief secret of comfort lies in not suffering trifles to vex one, and in prudently cultivating an undergrowth of small pleasures, since very few great ones, alas! are let on long leases.—SHARP.

THERE cannot be a more glorious object in creation, than a human being, replete with benevolence, meditating in what manner he might render himself most acceptable to his Creator, by doing most good to his creatures.—FIELDING.

THE PENDULUM. II.

IN our last paper we saw that, in ordinary circumstances, the time of the vibration of a pendulum-bob depends on the length of the string or rod of the pendulum; but that it does not follow the ratio of the length. If a seconds' pendulum be 39¼ inches long, a pendulum of half that length will not vibrate half-seconds. The time and length bear a relation, which we have thus expressed:—*the time varies according to the square root of the length, or the length according to the square of the time.* By this is meant, that the length of a pendulum to vibrate in a certain time, is to that of another pendulum vibrating in a different time, as the square of the time taken by the first pendulum is to the square of the time of the other. Thus, if the length of a seconds' pendulum be set down at *one yard*, then the length of one which will vibrate two seconds, must not be taken at *two* yards, but at the square of two, or *four* yards; and for a three seconds' pendulum, it will of course be nine yards. The length of a half-seconds' pendulum is one-fourth of the length of a seconds' pendulum; and that of a pendulum to vibrate three times in a second is one-ninth of the same length.

It has been found by experiment, that at London, the length of a pendulum vibrating once in a second, (or 86,400 times in a day, which can of course be determined by astronomical observations,) is 39·1393 inches. Consequently, the length of a pendulum to vibrate

			Inches.
In a quarter of a second, is	1/16 of 39·1393	or	2·44620625
For a third do.	⅛ do.	or	4·34881111
For half do.	¼ do.	or	9·784825
For a second			39·1393
For two seconds	4 times do.	or	156·5572

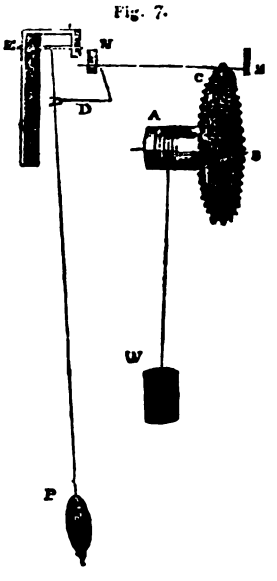
The pendulum of the clock of St. Paul's vibrates two seconds, and is therefore of the last mentioned length, or about thirteen feet.

In all these cases, we have talked of the *length* of a pendulum-rod, without explaining what is meant by that term. For rough experiments, it will be sufficient for the reader to measure from the point of suspension to the centre of the ball or bob of the pendulum, and call that the length. But this is not scientifically correct. The virtual length of a pendulum, or that on which its time of oscillation depends, is the distance from the point of suspension to an imaginary point called the *centre of oscillation.* To find this point requires a complex mathematical calculation; and its situation does not depend on the actual length alone of the pendulum. Its place is also influenced by the *comparative weight* of the different parts, but not by the *whole weight* of the mass. We shall merely state that its place depends, in great measure, on that of the *centre of gravity* of the whole pendulum. Now, of course, by lengthening the string of a pendulum, we lower the centre of gravity, and also the centre of oscillation, and, therefore, increase its virtual length; and the contrary takes place in shortening it.

We will now consider the pendulum of a clock as it is actually constructed, together with the *escapement,* or that part or *movement* of the clock, which connects the pendulum with the machinery, so as to keep the latter always going at the same uniform rate.

The mechanism of a clock (independent of the striking-machinery) may be briefly stated to consist of a barrel, or cylinder, A, on which is wound a cord carrying a weight, W. The manner in which this weight, by descending, turns the barrel, has already been shown in the articles on the MECHANICAL POWERS. Let the reader suppose it ensured that this barrel must revolve once in twelve hours. Then the axle B of the barrel may may have a hand attached to it, which will revolve on a dial divided into twelve parts, each of which it will traverse in an hour. This is the hour-hand. Now, if on this axle a toothed wheel be fixed, working on another axle a pinion of one-twelfth of its own size, this latter axle will revolve once in an hour, and may be made to carry the minute-hand. By another step or two, another axle is made to revolve once in a minute, and this carries the second-hand. Thus, the whole clock consists of a train of multiplying wheels, like that described in our article on the WHEEL AND AXLE.

Fig. 7.

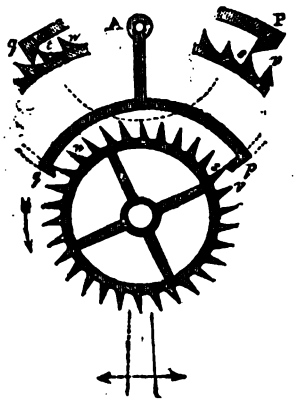


Now, if such a clock were wound up and set going, the weight would fall to the ground with great and increasing speed, dragging round the machinery still more rapidly. In a few minutes it would require to be wound up again, the wheels and hands having spun round as many times perhaps as in a common clock they do in a week. Such an instrument would evidently be of no use whatever as a time-keeper: the only point in which it would be correct would be in the *proportions* which the velocities of the different parts would have to each other. Thus, the minute-hand would revolve twelve times, while the hour-hand revolved once; and once, while the hour-hand moved through one division or hour-space. The second-hand would revolve sixty times, while the minute-hand revolved once; or once, while the minute-hand moved through one division or minute-space. But these portions of time would have no resemblance to real hours and minutes. What we want, therefore, is a *regulating power* which will allow these parts to revolve only with a certain *absolute* velocity; for their *relative* velocity is already given them by the prime *moving power,* that is, the gravity of the weight W.

Now, it matters not to what part of the machine this regulating power be applied; for if we regulate one wheel, or give it its proper absolute velocity, all the others must necessarily have theirs also. So that the second-hand, the minute-hand, and the hour-hand will likewise have their relative velocities to each other, on account of the relative sizes of the various wheels by which they are connected.

The regulating power commonly employed, is the PENDULUM, P, which acts on, and is acted on by, the axle of the second-hand, along the rod M N, through the intervention of a peculiar contrivance called an *escapement.* The pendulum in the foregoing figure, is suspended from E, and communicates its motion to the ratchet at C, by means of the bent wire D; but the following figure shows this, the most common and simple form of escapement, with a front and enlarged view We should not, however, omit to mention that there are a great many more complicated forms contrived to remedy certain defects, into the consideration of which we cannot here enter, as they pertain more properly to the art of watch-making.

Fig. 8.



The wheel represented in this figure is called the *swing wheel*, and is fixed on the arbor, or axis, which bears the second-hand. The object is, therefore, to make it revolve once in a minute; and it has thirty teeth of the form shown in the engraving. Above this is a metal arc, suspended from the axis A, so as to swing freely backwards and forwards. The pendulum is placed behind this apparatus, as shown in fig. 7; and the fixed point from which it hangs is quite unconnected with any moving part of the clock; as it is essential that the point of suspension should be free from any shaking or unsteadiness. The oscillations of the pendulum, however, are communicated to the arc, or ratchet, by means of the bent wire which connects the latter at A, with the rod of the pendulum. At the two ends of the arc are two peculiarly shaped projections *p q*, called *pallets*; and when the arc is swung backwards and forwards, they fall by turns into the intervals between the teeth of the swing-wheel; thus stopping the wheel, and only allowing it to move through the space of one tooth, during each double oscillation of the pendulum.

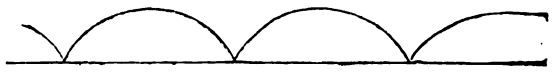
In the figure, the arc is supposed to be moving out at the right, and the pendulum to be almost arrived at the end of its oscillation. The pallet *q* is falling in between two teeth, so as to stop the wheel; while the pallet *p* is raised clear of the tooth *s*. Now, when the pendulum returns towards the left, the arc will move out at *q*, and the pallet *q* will be raised clear of the tooth, which is now pressing against it. This tooth will consequently pass on in the direction indicated by the arrow; that being the constant direction in which the wheel is urged on by the *maintaining power* of the weight. It is from this *escaping* of the teeth in succession from the restraint of the pallets, that this contrivance obtains the name of *escapement*.

But more than one tooth cannot escape at once; for during the oscillation of the pendulum to the left, as soon as the pallet *q* has been raised free of the tooth pressing against it, the pallet *p* slides down the sloping side of the tooth *s*, into the space between the teeth *s* and *v*, and the wheel is again stopped. The pendulum now begins another oscillation to the right, the pallet *q* falls into the next space, and keeps the wheel stopped; while the pallet *p* is again raised free of the wheel. When the next oscillation to the left begins, the former action is repeated. Hence, if the pendulum vibrate seconds, one tooth will escape during each double oscillation of the pendulum, or every two seconds; and, therefore, if the wheel have thirty teeth, it will perform a complete revolution in a minute; and of course, all the other parts of the machine have their proper velocities. Besides this action of the pendulum on the swing-wheel, the latter acts on the pendulum; for each tooth, before it escapes, presses on one of the pallets *p q*, and thus restores to it that force, which it would otherwise have lost by friction, and the resistance of the air. In this manner, if the moving and regulating powers be properly proportioned to each other, the latter will not only restrain and equalize the former, but the former will maintain the latter in a state of constant oscillation, without any diminution in the extent of such oscillation.

From what has been said before, we can easily understand, that, if a clock *loses*, we must shorten the pendulum-wire,—and lengthen it if the clock *gains*. This is done, in effect, by raising or lowering the bob of the pendulum, (P, fig. 7,) by turning the screw at the bottom.

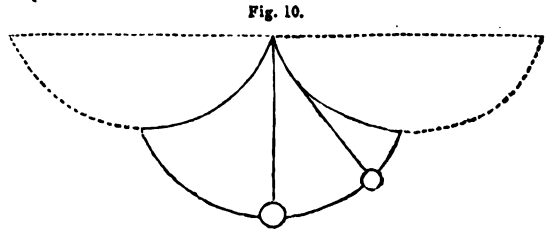
We have stated in the former paper, that the oscillations of a pendulum, however they may vary in size, are *isochronous*, or equal in time. This, however, is not strictly correct in the case of the common pendulum, whose oscillations must necessarily be arcs of circles. It has been proved mathematically, that, in order that a pendulum may be perfectly isochronous, it must not move in a circular arc, but in a peculiar curve called a *cycloid*. This curve is the path described by a point, which revolves round a centre, which centre is at the same time moving on in a straight line. Thus, every point in the circumference of a coach-wheel, or any other *rolling* body, describes a succession of curves like the following, which are *cycloids*.

Fig. 9.



These curves are drawn by fixing a small piece of black-lead to the edge of a sixpence, or any other flat round body, and rolling it along on the edge of a ruler, which coincides with the straight line on the paper. Now, if a weight, suspended from a string, be made to describe, in oscillating, part of one of these curves, (inverted, as in the following figure,) it will be a perfectly isochronous pendulum, whether it describe the whole of the curve or only a small part; so that we should not need to keep the oscillations always equal in length, as in common clocks.

Fig. 10.



Now, if the rod of a pendulum be solid and inflexible, it can evidently describe no other curve but a circle, because it is always kept at the same distance from its centre, which is the point of suspension.

But if the rod be composed of string or any other flexible substance, we can make it describe any curve we please, by enclosing the upper part between two curved surfaces called *cheeks*, as represented in fig. 10. The string of the pendulum is thus bent, or partially wound on these surfaces, so as continually to alter the distance of the centre of oscillation from the point of suspension. The curve described by the pendulum then depends on that of the cheeks. If the motion of the pendulum is to be cycloidal, and therefore isochronous, cycloidal cheeks must be provided; each being half a cycloid of the same size and shape as the cycloid described by the pendulum. The advantages of such a pendulum would be very great; for its oscillations would occupy no longer time when they took in the whole cycloid, than when they constituted only a small part of it.

There are, however, serious practical difficulties, which render this form of pendulum incompatible with the various advantages of the common form; so that,

on the whole, though perfect in theory, it is not adapted to practice. And when we consider how nearly isochronous the common pendulum is, even in its worst form, we shall find that we may dispense with the extra advantage gained by a cycloidal pendulum; especially when we remember that, as long as the beats of any pendulum are equal in size, they must be isochronous. Now, in a good clock, the beats of the pendulum can hardly differ in size appreciably; though any such difference of time might be calculated, but not perceived.

MATERIALS FOR THE TOILETTE.

No. VI.

ON HAIR-BRUSHES.

IN considering such articles as may be reckoned necessary appendages to the toilette, we must not pass over the different kinds of brushes which are in use for the cleansing and preservation of the clothes, the hair and the teeth. Their fabrication is so extremely simple that we need not occupy much space in describing it. The common method is this: when the piece of wood in which the hairs are to be placed is cut to the size and shape required, it is drilled full of small holes, and in each of these holes is placed a bundle of hairs folded together, so that the ends shall all project on one side, while on the other they are secured by means of wire passed through the bent part. With the addition of glue, which is placed in the holes to keep the bundles firm, they are now perfectly secured; but the back of the brush has an unsightly appearance, and it is necessary to cover the rough surface formed by the wire-work and the projecting parts of the hair. For this purpose, in the case of clothes and hair-brushes, a thin coating of some finely polished wood is often *veneered* upon the back of the brush, or, in other words, a thin plate of fancy wood is laid down in glue, on the surface of the plainer material.

In 1830 a patent was obtained by Mr. T. Mason, for an improvement in the manufacture of brushes, and by his invention the hairs are more firmly fixed in the stock of the brush, and the process of veneering is rendered unnecessary. Instead of holes drilled in the wood for the purpose of securing the knots of hair, there are grooves formed like a dove-tail, wider at the bottom than at the top, and into these, after dipping them into cement, the ends of the bundles of hair are placed. A pair of pliers is then used to press the ends of the hair into the recess, or wider part of the dove-tailed groove, where the cement will cause them to adhere firmly to the stock of the brush. These grooves may be formed with threads or teeth at the sides, instead of being dovetailed, and into these threads or teeth the hair will be forced by compression. The knots of hair are successively placed in the groove, and forced up by a tool against the last knot put in, and so on, until the grooves are filled. A metal ferule is often placed on the outside of the stock of the brush, and secured by pins or rivets.

The kinds of brush in common use, as well as the shapes in which they are made, are various: the hair employed in their construction also differs according to the purpose for which the brushes are required. Thus we have round, flat or square brushes: brushes for the clothes, for the head, for horses; for the use of weavers, painters, &c. The flesh-brush is applied as a remedy for rheumatism, as well for certain cutaneous disorders. The wire-brush, as formed of brass or ironwires, is used by silversmiths and gilders for scrubbing silver, copper or brass, previous to gilding them. There is a method of raising a colour on leather, by only rubbing the skin with a brush. The French leather-gilders call it *broussure*, and it is the lowest of all the forms of dye allowed by their statutes. In China, a brush is used by painters which is formed of the fibres of some plank; these are fretted out at both ends, and then tied together for use.

We are chiefly concerned, however, at present with brushes appropriated to the uses of the toilette, and as we have already described their general construction, we now devote our attention to the use of hair-brushes in particular. But first let us say a few words respecting the physiology of the hair itself.

Each hair is contained in a delicate sheath, which dilates into a small pouch, containing the bulb of the hair. The soft pulp which this bulb encloses, consists apparently of blood-vessels and nerves: on the surface of the bulb, the substance forming the hair is secreted, and as each layer pushes forward the succeeding one, the substance gradually advances along the sheath, and projecting beyond the skin grows freely beyond it. Each of the sheaths containing the hair is supplied with one or two little glands, where oil is secreted to lubricate the hair, and keep it supple. Possessing neither vessels nor nerves, except at their base, hairs are seldom altered, except by diseases of the skin. Their loss of colour, which arises from a deficiency in the secretion of colouring oil, is sometimes very rapid, and can rarely be remedied. When a due supply of moisture is not obtained, the hair grows brittle, and will split at the points, or break off at the middle of its length. There is a distressing disease which occurs almost exclusively in some towns in Poland, and is on that account called *plica polonica*, in which the hair of the head becomes sensitive of pain, and is said to bleed when cut. This sad complaint is accompanied with general disease of body, and often proves fatal to those afflicted by it.

On the state of the skin of the head must necessarily depend, in a great measure, the beauty and preservation of the hair; for the hair is nourished by the blood-vessels placed in this organ, and the substance of which it is formed is secreted from the same. If the skin be neglected, the hair usually becomes weak, and falls off, but if the healthy action of the former be restored, the hair is also strengthened. We all know that sickness and disease will impair the beauty of the hair, and that its strength and thickness greatly depend on the general health of the body. But in many cases, the hair grows weak and thin, at an early age, without any apparent cause, and we cannot but entertain the opinion that this evil (for an evil it is to lose so graceful a covering to the head,) might be in a great measure prevented by a proper attention to the state of the skin, and by preventing the accumulation of the epidermal scales, which in some individuals are so long neglected as to be very difficult to remove. For this purpose the daily use of a hair-brush which is sufficiently penetrating to reach the skin, should not be omitted, or slightly employed. The longer the hair is, the more necessary is this operation, and the greater should be the length of time devoted to it, so that for those who are not inclined to give considerable attention to the state of their hair, we would recommend the wearing it as short as possible, when the trouble of reaching the roots will be less, and it will be easy to keep the skin of the head in a healthy state. The constant use of the brush will, in many cases, be sufficient to preserve the glossy appearance of the hair, without the application of pomatums or oil, but where they are absolutely necessary, still let them be employed sparingly, for a state of greasiness

is not natural to the hair, and instead of strengthening and improving it, it has a directly contrary effect. In using any unguent, the best way of applying it is to imbue with it a very soft hair-brush, and so diffuse it equally through the hair, after which, a harder brush may be used with advantage.

Of the various sorts of pomatums used for the hair the usual base is hogs' lard. That which is called bears' grease, is sometimes composed of the same material in a rancid state. Perhaps the consistence of these unguents resembles more nearly the natural oily secretion at the roots of the hair, than do the more fluid preparations, and it is reasonable to suppose that they will on that account be more beneficial. A good pomatum may be prepared by taking of beef-marrow, hogs' lard, and spermaceti, each an ounce; of oil of ben a pint; melting the whole together; then straining through a linen bag and adding a dessert-spoonful of oil of bergamot, and of oil of roses, and of oil of nutmeg, each ten drops. Many of the sweet smelling oils sold by inferior perfumers in the metropolis, decked with French labels, are nothing more than olive oil or oil of turpentine, scented with a few drops of the volatile oil whose name is on the label. A good hair-oil may be prepared from a pint of oil of sweet almonds and an ounce of spermaceti, melted together, with the addition, when cold, of a table-spoonful of oil of bergamot.

The fangs of a bear, and the tusks of a wild boar, do not bite worse, and make deeper gashes, than a goosequill sometimes: no not even the badger himself, who is said to be so tenacious of his bite, that he will not give over his hold, till he feels his teeth meet, and the bones crack.—Howell.

He that spends to his proportion is as brave as a prince; and a prince exceeding that is a prodigal: there is no gallantry beyond what is fit and decent. A comely beauty is better than a painted one. Unseemly bounty is waste both of wealth and wit.—Feltham.

As we ought not to make the gratification of our external senses the main end of life, so neither ought we to indulge our taste for the more refined pleasures, those called the pleasures of imagination, without some bounds. The cultivation of a taste for propriety, beauty, and sublimity, in objects natural or artificial, particularly for the pleasures of music, painting, and poetry, is very proper in younger life; as it serves to draw off the attention from gross animal gratifications, and to bring us a step further into intellectual life, so as to lay a foundation for higher attainments. But if we stop here and devote our whole time and all our faculties to these objects, we shall certainly fall short of the proper end of life.—Priestley.

The Manati, or *Sea-Cow*, from ten to sixteen feet in length, has a head somewhat like a bull-dog, nostrils semilunar, and eyes very small and near the snout; it is without ears in outward appearance, but has two small spiracula situated at the back part of the head: mouth large, with soft and protracted lips, fitted for laying hold of the grass or herbage growing near the shore; neck short, and body covered with a rough, blackish skin, thinly sprinkled with bristly hair; the belly and sides near the tail, white. From the shoulders protrude two pectoral fins (the only fins on the animal,) resembling arms, with which it supports itself in the water, and which enables the female to give suck to its young (of which it only bears one at a time) who receives it from several porous openings or mammæ in the breast of the animal. The tail is formed like that of the whale. It is not an amphibious animal, never leaving the water, but feeding upon the aquatic plants and shrubs growing on the borders of the rivers and lakes, sometimes elevating its head to munch at the bushes which overhang them. Its flesh is white and delicate, resembling veal in appearance and taste, particularly when dressed, and it will keep good several weeks, even in the hot climate of which it is a native, when other meat will not resist putrefaction for as many days.—Martin's *British Colonies*.

ELECTRICITY.

XIV.

Electrical Experiments.

In our last paper we enumerated a few of what are very appropriately termed, the mechanical effects of electricity. On the present occasion we propose to consider some of its chemical agencies.

And first of all let us give two or three examples of the extraordinary evolution of heat which accompanies even very feeble currents of electricity.

Having procured some cotton wool, wrap it loosely round one the balls of the *Universal Discharger*, and sprinkle on its surface some finely-powdered rosin. If a charge from a moderate-sized Leyden jar be now passed through the cotton, the rosin will be inflamed.

Dip cotton wool in oil of turpentine and pass a charge through it in the manner just described, and the turpentine will be inflamed.

Enclose in some cotton a very small piece of phosphorus, and attach it slightly to the conductor of the machine. On bringing a brass ball near to the cotton and passing a few sparks through it, the phosphorus will burst into a flame.

The manner of inflaming spirit of wine and ether has been already explained *.

Provide a bladder with a stop-cock attached, and fill it with coal-gas. Hold the orifice of the stop-cock within about an inch of the conductor; a small quantity of gas being at the same time permitted to escape. On setting the machine in motion, the sparks which pass from it to the stop-cock will ignite the gas. This experiment can be varied by receiving the electricity from the finger of a person in communication with the machine but standing on an insulating stool.

In a room fitted up with gas-burners the effect will appear still more remarkable, as the room may be lighted up in a few minutes in the manner just mentioned.

Procure a small (sheep's) bladder capable of containing from 5 to 10 cubic inches of gas. Fit up a sound cork with two pieces of copper wire, which must pass through it, having their ends bent at right angles, and approaching within about an eighth of an inch of each other, and terminating at the other ends in small hooks or rings. These arrangements being complete, let the bladder be filled with a mixture of hydrogen and oxygen gases, in the proportions of two volumes, by measure, of the former, to one volume of the latter. The cork should now be fastened securely into the neck of the bladder, and in such a way that the projecting points of the wires may be in free communication with the gas. The bladder being suspended from the ceiling or against the wall, (or, if proper precautions to prevent accidents be used, it may be held by the operator,) let conducting wires, be attached to those in the cork, one of which must communicate with the electrical machine and the other with the earth, and on causing a spark to pass through the bladder between the points of the wires, the gas will be inflamed, and explode with a loud report.

By their frequent recurrence we become so familiarized with the ordinary effects of heat upon inflammable bodies, that we hardly ever take the pains to investigate the true character of the phenomena, as presented in some of the most simple instances of combustion.

There is no example more instructive on this subject than that which is furnished by a common tallow candle. Let us for a moment examine into that what takes place when a candle is first lighted, and also

* See *Saturday Magazine*, Vol. XIV., p. 61.

during the subsequent stages of its combustion. A condition here necessary is that the wick be in contact, for a period longer or shorter according to circumstances, with a heated, or, as is more frequently the case, with a burning body. A candle may be lighted by contact with some particular substances which are at a bright red heat; but in this case the issue will depend on the quantity as well as the temperature of the heated body; a bar of iron, for instance, of an inch square being more effective than one of a quarter of an inch, although the temperatures of both may be alike. Experience teaches that a candle can be lighted more quickly by contact with a burning, by which we mean a *flaming*, body than by a substance at merely a red heat; whence it may, we think, be inferred that the specific temperature of flame, if it proceed from a narrow slip of paper or a single fibre of sewing-cotton, is greater than that exhibited by most, if not all, kinds of bodies at a red heat.

In lighting a candle the change effected is so sudden that it seems impossible there can be in the first act of ignition, or in its subsequent stages, anything resembling what in some other cases we denominate a series of results following each other at stated intervals. However difficult it may be, through the obtuseness of our perceptions, to recognise these results separately and in succession, yet it cannot be denied that they do actually occur in that manner.

The act of combustion (inflammation), implies that at one particular part the burning body has had its temperature very much raised, and, if it be a solid, that liquefaction and vaporization, as being processes preparatory to ignition, must have taken place. If it be a solid, as wood, for example, which is incapable of assuming a liquid form, we may imagine it to be converted into vapour. But under the circumstances we are describing the vapours of the most inflammable bodies are speedily changed, and by a new arrangement of their particles they become gases, and these, almost before we can conceive that they have a distinct existence, are destined to undergo separation and change by uniting with the oxygen of the atmosphere.

In a newly-lighted candle we observe first of all the heating of the wick. The liquefaction of the tallow immediately surrounding it next follows, then its vaporization, and finally its conversion into gas. The gas owes its inflammability to its union with oxygen, and from that union proceeds two different substances; one class of gaseous particles (hydrogen) by their union with oxygen constituting pure water, and the other (carbon), restored again to the vaporous form, by uniting with oxygen produces carbonic acid gas.

Hence, therefore, we conclude that the phenomena exhibited in the ordinary effects of heat, but especially in those effects upon inflammable bodies, are not only more complicated, but more curious and beautiful than many persons imagine; combustion not being one simple process, but consisting of several processes which follow each other in rapid succession; the origin as well as the results of these processes being perfectly distinct, although they may appear to be identical and simultaneous.

Let us now return to our electrical experiments; which we hope will be the better understood by what has just been said; for whilst contemplating the extraordinary energy of the electric spark as shown in the cases described at the commencement of this paper, we think it will be admitted that, in its mode of operation, as well as in the effects produced, there is a very striking analogy subsisting between electricity and heat.

If we examine attentively the conditions requisite to the successful issue of an electrical experiment, as the ignition of an inflammable body for instance, we find that the manipulations always have reference to the character or habits of the material operated upon.

Thus, in operating upon rosin, it is necessary that it be minutely divided; a condition more favourable to its sudden ignition than when in large masses. The use of the cotton wool is simply for retaining the rosin amongst its fibres; a convenient mode of presenting it to the action of the spark.

In the experiment with oil of turpentine, we need hardly mention that by being diffused over cotton its evaporation is greatly promoted, and hence it is the more easily inflamed.

We mentioned on a former occasion, when giving directions for inflaming spirits of wine, and ether, that the former requires to be warmed, and the latter does not, which is accounted for by the difference in their rates of evaporation.

Another circumstance which might be noticed, is, that in some instances the most feeble spark we can obtain is sufficient to cause ignition, whilst in others an accumulated charge is required. These are conditions, however, to which we attach but little importance, the difference being occasioned, perhaps, by the form, rather than by the composition of a substance.

These hints must suffice to indicate the general principles on which we may trace a resemblance between the effects of heat and of electricity, and whilst we endeavour to ascertain in what respects their modes of operation agree, it will be equally interesting to notice those which are dissimilar.

Wherever electricity is concerned, the suddenness of its action is sure to arrest attention. But are not the effects of heat, under favourable circumstances, produced with equal alacrity? As respects each of the inflammable bodies just now enumerated, we know that the smallest jet of flame we can procure, when presented to either of them under the most favourable conditions, is sufficient to cause instantaneous ignition.

Here we must break off. We have endeavoured to show that the electric spark, by causing the ignition of inflammable bodies, possesses properties analogous to those of heat. It has also been shown that combustion is not a simple process, but the result of several processes; part of which are accompanied by the decomposition, and others, by the recomposition of the elements of which the substance acted upon consists; and although these processes appear to us to be indivisible, yet we know they are distinct and follow each other in regular succession.

In the ignition of gaseous bodies, whether by the agency of heat or of electricity, the recomposition of the elements is the object attained. In the case of coal-gas, and of the explosive mixture of hydrogen and oxygen, there had been a decomposition by a previous process.

Darkness and light divide the course of time, and oblivion shares with memory a great part even of our living being; we slightly remember our felicities, and the smartest strokes of affliction leave but short smart upon us. Sense endureth no extremities, and sorrows destroy us or themselves. To weep into stones are fables. Afflictions induce callosities; miseries are slippery, or fall like snow upon us, which, notwithstanding, is no unhappy stupidity. To be ignorant of evils to come, and forgetful of evils past, is a merciful provision of nature, whereby we digest the mixture of our few and evil days, and our delivered senses not relapsing into cutting remembrances, our sorrows are not kept raw by the edge of repetition.—Sir Thomas Browne.

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WOLVERHAMPTON.

VIEW OF WOLVERHAMPTON.

WOLVERHAMPTON is the name both of a parish in Staffordshire, and of the principal town in that parish. The parish contains the towns of Wolverhampton and Bilston, the chapelries of Pelsall, Wednesfield, and Willenhall, and the townships of Featherstone, Hatherton, Hilton, and Knivaston. It is of the town of Wolverhampton that we here propose to speak.

Wolverhampton is about 123 miles from London. The name originated in the following circumstance:— It was called Hanton or Hamton, prior to the year 996, when Wulfrana, sister of King Edgar, and widow of Aldhelm, duke of Northampton, founded a college here, in which she placed a dean and several prebendaries, or secular canons, endowing it with so many privileges, that the town acquired the name of Wulfranis Hamton, or Hamton of Wulfrana, from which the word Wolverhampton was derived.

At the Conquest this college, which was dedicated to St. Mary, was granted to Samson, William the Conqueror's chaplain. On the death of Samson, in 1115, the Bishop of Chester laid claim to the manor and college, as lying within his diocese, and King Stephen granted it to him; but he afterwards revoked the grant, and bestowed it on the Bishop of Worcester. At a subsequent period, about the year 1200, the great possessions of the canons led them into such a licentious course of life, that Peter Blesensis, the dean, after trying unsuccessfully to reform their dissolute lives, surrendered the establishment to Hubert, archbishop of Canterbury; and it was subsequently annexed, by Edward the Fourth, to the deanery of Windsor. Many establishments of this kind were abolished in the reign of Edward the Sixth, and at that period the king took possession of the collegiate church at Wolverhampton, and presented it to the Duke of Northumberland. But not long after, being attainted and executed for treason, in the following reign, the duke's estate became forfeited, whereupon "the queen, taking into consideration the great love which King Henry the Eighth, and other kings of England, from the time of King Edward the Third, did bear towards the dean and canons of the royal chapel of St. George at Windsor, and also because her father and other her progenitors were there buried, and the stalls of the famous order of the Garter were in the said chapel; and likewise farther considering the great loss the dean and canons sustained, by the taking the said church and lands from them, so that they were not so well able to undergo the charges belonging to them, did, by her letters patent, dated at Westminster, in the said first year of her reign, again annex the deanery of Wolverhampton to the deanery of Windsor, as formerly it had been before the act made in the first year of King Edward the Sixth." These privileges were subsequently renewed and confirmed by Elizabeth and James the First, but the deans of Windsor shortly afterwards leased the manor of Wolverhampton.

The chancel, choir, and stalls shared the usual fate of such establishments, during the Commonwealth, whereupon "one Sylvester Pierson, a clerk then of this church, thought it no offence in him not only to take away the lead, iron, &c., but even the very monuments of the dead, since his masters had got what estate belonged thereto in their private hands, upon which not only the monuments were much defaced and spoiled, but the chancel itself brought to utter ruin; and so kind were the people of those times unto him, that they never questioned him for it, but rather pitied him by reason of some hurt he received when he endeavoured to make his escape by leaping from the battlements of the church upon the north porch." Thus it remained for some years, when, an inquiry

having been made into the state of the chancel, it was reported, "Something above half the lead remains on the roof, the beams rotten at the ends, and most of the timber too bad for use again; the glass all gone, and the little iron remaining not worth much, being so eaten with rust. It is supposed that 500*l.* will but do the repairs, the stone-work being very much decayed by the wet setting in. The old stalls remain, but so rotten and out of order, that they signify little." The Dean of Windsor repaired these injuries out of his private purse.

The church was originally dedicated to the Virgin Mary; but in the time of Henry the Third the dedication was altered to that of St. Peter. It is sometimes called by both names conjointly.

Having thus given what may perhaps be termed the ecclesiastical history of Wolverhampton, we proceed to describe the town.

Wolverhampton is situated on an eminence, in a district abounding in mines of coal, iron, and limestone, which have had a great influence on its prosperity. It consists of several streets, diverging from the market-place (in the centre of which is a cast-iron pillar, forty-five feet high, supporting a gas lantern) to the several roads from which they take their names. The houses are in general substantial and neatly built of brick, many possessing much elegance. The town is rather irregularly paved, is lighted with gas, and supplied with water from wells sunk to a great depth in the rock on which it is built.

The old church, whose history we have given, is a spacious cruciform structure, partly in the early decorated, but principally in the later style of English architecture, with a handsome square embattled tower, rising from the centre, the upper part of which is a very fine specimen of the later style. The interior, with the exception of the chancel, is generally of more ancient character: the piers and arches of the nave and transepts, if not of the early English, are of that style merging into the decorated; and the pulpit, of one entire stone, is richly embellished with sculpture. An antique octagonal font, which is here seen, is supported on a shaft, the faces of which are decorated with the figures of St. Anthony, St. Paul, and St. Peter, in bas-relief. Several statues of brass and of alabaster are placed in different parts of the church, and among the relics of other days is one of those curious old epitaphs, such as we frequently meet with in country churches or church-yards:—

Here lieth, withouten miss,
The body of Richard Tomkys and his wife Allis,
Which Richard, in June the second day,
Towards Heaven he took his way.
In the year 1501 his body and bones
Were laid under this stone,
Whose soule sweete Jesu have mercy upon.

Near the south-west corner of the church-yard is a large vault, thirty feet square, the roof of which is finely groined, and supported on one central pillar: the walls are three yards in thickness, and on both sides of the doorway are slight vestiges of sculpture: the interior is in good preservation. It was probably a portion of the basement story of the ancient college built by Wulfrana.

There is a more modern church in Wolverhampton dedicated to St. John. It is rather an elegant structure, in the revived Grecian style of architecture, with a handsome tower, surmounted by a lofty and finely-proportioned spire. The prevailing character is a mixture of the Ionic and Corinthian orders. A pleasing and appropriate effect is produced by the arrangement of the interior; the altar is ornamented with a good painting of the Descent from the Cross, *by Barney, a native of* Wolverhampton.

Another church, dedicated to St George, was also decided upon a few years ago, the expense being defrayed partly by public subscription and partly by the parliamentary commissioners. There are also places of worship for Baptists, Quakers, Independents, Methodists, Unitarians, and Roman Catholics.

The establishments devoted to public instruction are the Grammar-school, the Blue-coat charity school, and several Sunday-schools. The Grammar-school was founded, under letters patent of Henry the Eighth, in 1513, by Sir Stephen Jenyns, a native of Wolverhampton, and Lord Mayor of London a few years before. He endowed it with estates in the parish of Rushoe, in the county of Worcester, which with other grants produced the large revenue (for those days) of 1170*l.* per annum. The management was originally vested in the master and wardens of the Merchant Tailors' Company in London; but, on some disagreement between them and the inhabitants, they petitioned the Lord Chancellor to be released from the governorship. Consequently a decree in chancery was made, by which the governorship was vested in forty trustees, including the Bishop of Lichfield and Coventry, and the two county members for the time being. The building was erected in 1713, and is open as a school to all boys of the town; the present number on the foundation being about one hundred and fifty. The head-master has a salary of 500*l.* per annum, and the usher 200*l.*, with residences; and there are also masters for writing, drawing, French, and German, with salaries of from 70*l.* to 84*l.* per annum. The able, but somewhat eccentric, surgeon, John Abernethy, and Sir William Congreve, the inventor of the Congreve rockets, were educated at this school.

The Blue-coat charity school is a very ancient foundation for educating thirty-six boys and thirty girls, six of each sex being also clothed and maintained. It has an endowment arising from a farm at Siesdon, tenements in the town, and funded property, purchased with accumulated benefactions, producing more than 240*l.* per annum.

A public subscription library was established in 1764, which contains more than five thousand volumes, and for which a neat and commodious building was erected in 1816, when a news-room was added. Over the library is an assembly-room.

The manufacture of the finer kinds of steel ornaments, which was formerly carried on extensively, and brought to the highest perfection in this town, has given place, to some extent, to the manufacture of the heavier articles of steel and iron, of which the principal are smiths' and carpenters' tools of every description, files, nails, screws, gunlocks, hinges, steel-mills, and machinery,—locks, for the making of which the town has long been celebrated,—furnishing ironmongery, articles of brass, and japanned wares.

The iron and steel manufacturers of Wolverhampton have been celebrated from an early period. Dr. Plot, who wrote a *History of Staffordshire* about 1690, after alluding to other works in metal, says:—

Nay, so curious are they in lock-work, (indeed beyond preference,) that they do contrive a lock which shall shew, (if the master or mistress send a servant into their closet with the master-key, or their own,) how many times that servant has gone in, at any distance of time, and how many times the lock has been shot, for a whole year; some of them being made to discover it 500 or 1000 times. Farther, there was a very fine lock made in this town, sold for 20*l.*, that had a set of chimes in it that would go at any hour the owner should think fit. These locks they make in brass or iron boxes, curiously polished, and their keys finely wrought, not to be exceeded.

Many of the workmen formerly prided themselves

on making locks which should be curiosities on account of the ingenuity displayed in their construction. A workman in the last century made a padlock and key which did not exceed in weight that of a silver twopence, and another lock, made wholly of iron, which did not exceed the weight of a silver penny. He even engaged to be able to make a dozen locks, with their keys, which should not weigh more than a silver sixpence altogether.

We have said that Wolverhampton is now supplied with water by means of wells. But in the time of Dr. Plot the supply was wholly obtained from four springs, called, from the purposes to which they were applied, the *pudding* well, the *horse* well, the *washing* well, and the *meat* well. From the last-mentioned the inhabitants used to fetch all the water used in culinary operations, in leather buckets laid across a horse; while the horses were watered in a second, and linen washed in a third.

There prevailed in Wolverhampton, until towards the end of the last century, a custom which the Rev. Mr. Shaw describes. An annual procession took place, on the 9th of July, of men in antique armour, preceded by musicians playing a particular tune, and followed by the steward of the deanery manor, the municipal officers, and many of the principal inhabitants. Tradition says, the ceremony originated at the time when Wolverhampton was a great emporium of wool, and resorted to by wool-merchants from all parts of England. This procession took place on the eve of a great annual fair held in the town, which used to last sometimes fourteen days: and it has been supposed that this was originally a measure of precaution, for the preservation of peace. The men, twenty in number, were fitted out by the principal inhabitants.

There was also a festival prevalent in the last and preceding centuries, called *processioning*. On the Monday and Tuesday in Rogation week, the sacristan, prebendaries, and choristers of the collegiate church assembled at morning prayers, with the charity children, bearing long poles covered with most of the kinds of flowers then in bloom, and which afterwards carried through the streets of the town with much solemnity, the clergy, singing men and boys, dressed in their sacred vestments, closing the procession, and chanting the canticle, *Benedicite, omnia Opera*, and other portions of sacred music. "This ceremony," says Mr. Shaw, "innocent at least, and not illaudable in itself, was of high antiquity, having probably its origin in the Roman offerings of the Primitiæ, from which (after being rendered conformable to our purer worship,) it was adopted by the first Christians, and handed down, through a succession of ages, to modern times. The idea was, no doubt, that of returning thanks to God, by whose goodness the face of nature was renovated, and fresh means provided for the sustenances and comfort of his creatures."

The human mind considered as that of an individual, or collectively as that of an age, or a nation, is slow and gradual in its developement. At times it meets with obstructions that seem to prevent its expansion, and to retard its growth. But still it is, on the whole, found to be progressive in its march, and continual in its increase. The augmentation of its ideas to-day, becomes the preparation for a greater increase to-morrow. Every generation makes an intellectual advance beyond the preceding. Whatever doubts might exist on this subject, before the invention of printing, there can be no doubt that that art has not only accelerated, but perpetuated the intellectual progression of man. It is the opening of a better day on the prospects of the human race;—the dawn of a new era of mental improvement and intellectual activity.—Fellowes.

THE JEWS.

III.

Restoration of Israel.

It is our purpose in this notice, to throw together a few facts to show that the hope of being restored to the seat of their ancient glories, animates the children of Israel in a greater degree at the present time, than it has ever yet done during their long captivity in the bands of oppression and suffering; and that they look forward with increased anticipation, to that period when

The Lord shall set his hand again the second time to recover the remnant of his people, which shall be left, from Assyria, and from Egypt, and from Pathros, and from Cush, and from Elam, and from Shinar, and from Hamath, and from the islands of the sea. And He shall set up an ensign from the nations, and shall assemble the outcasts of Israel, and shall gather together the dispersed of Judah from the four corners of the earth*.

During eighteen centuries, the Jews have been prepared for their long-wished departure to, and concentration in, the Holy Land. There has always been a constant communication kept up between them, in all parts of the globe; hence it has been remarked, that the news of any great political movement has generally reached the members of their sect before the constituted authorities; and thus, many of them are, in European nations, connected with the funds, and other money-dealings. So rapid and accurate is their mutual communication, that Frederick the Great confessed the earlier and superior intelligence obtained through the Jews, of all affairs of moment. They are always in readiness for that great event; for the property they accumulate is mostly of a moveable kind.

Comparatively few of the Jews, (says Dr. Henderson, speaking of those of Poland, where the largest number of them are congregated,) learn any trade; and most of those attempts which have been made to accustom them to agricultural habits, have proved abortive. Some of those who are in circumstances of affluence, possess houses and other immovable property; but the great mass of the people seem destined to sit loose from every local tie, and are waiting with anxious expectation, for the arrival of the period, when in pursuance of the Divine promise, they shall be restored to what they still consider *their own land*. Their attachment, indeed, to Palestine is unconquerable†.

Mr. Herschel states that

Several thousand Jews of Poland and Russia have recently bound themselves by an oath, that as soon as the way is open for them to go up to Jerusalem, they will immediately go thither, and there spend their time in fasting and praying unto the Lord, until He shall send the Messiah. Although it was (continues the same writer) comparatively a short time since I had intercourse with my brethren according to the flesh, I found a mighty change in their minds and feelings, in regard to the nearness of their deliverance. Some assigned one reason and some another, *but all agreed in thinking that the time is at hand.*

Large bodies, moreover, have acted on this impulse, and the number of Jews in Palestine has been multiplied twenty-fold: though within the last forty years, scarcely 2000 of that people were to be found there, they amount now to upwards of 40,000; a multitude which is increasing by large annual additions. Indeed, of so great importance has this rapidly-increasing community been considered by our Government, that a British vice-consul was, in September last, appointed to reside in Jerusalem, where he is now fixed; his jurisdiction extending to the whole country within the limits of the Holy Land; "he is thus accredited, as it were, to the former kingdom of David and the Twelve Tribes‡."

* Isaiah, xi. 11, 12.
† *Biblical Researches, and Travels in Russia.*
‡ *Quarterly Review* for January, 1839, p. 188.

In all parts of the earth, this extraordinary people, whose name and sufferings are in every nation under heaven, think and feel as one man, on the great issue of their restoration: the utmost east and the utmost west, the north and south, both small and large congregations, those who have frequent intercourse with their brethren, and those who have none, entertain alike the same hopes and fears. Dr. Wolff (*Journal*, 1833) heard these sentiments from their lips, in the remotest countries of Asia: and Buchanan asserts that wherever he went among the Jews of India, he found memorials of their expulsion from Judea, and of a belief of their return thither*.

The liberality with which Jews are now regarded, is among one of the most gratifying evidences of the superior enlightenment prevailing at the present time. Their intercourse with Christians is daily becoming freer and closer; and its effects in awakening them from the darkness of error, and in loosening their faith in the many absurdities of the Talmud, are not less evident. The labours of Christian missionaries among the Hebrews have been rewarded with the richest fruits.

In reference to the changes taking place in the Jewish mind, (writes one of them,) a Jewish schoolmaster remarked: "There is a struggle going on, of which you can have no idea; we do not know ourselves what we want, or what will be the end of it." In reply to some remark which assumed that he believed his religious creed to be right, he said: "Oh, do not suppose that I am certain; I think I am right, *but I am in doubt. You will never find a Jew who will certainly say that he is right*†."

Dr. Wolff, as we have already stated, was listened to with patience and attention, in the East, while preaching the doctrines of Christ. Converts from the darkness of Judaism are rapidly augmenting in all parts of the world; but the most gratifying evidences of the fast increasing power of the Church of the Saviour, is the following information contained in a recent number of the *Quarterly Review*.

A more important undertaking has already been begun by the zeal and piety of those who entertain an interest for the Jewish nation. They have designed the establishment of a church at Jerusalem, if possible, on Mount Zion itself; where the order of our service and the prayers of our Liturgy shall be set before the faithful in the Hebrew language. A considerable sum has been collected for this purpose; the missionaries are already resident on the spot; and nothing is wanting but to complete the purchase of the ground on which to erect the sacred edifice. Mr. Nicolayson having received ordination at the hands of the Bishop of London, has been appointed to the charge; and Mr. Pieritz, an Hebrew convert, is associated in the duty. The service, meanwhile, proceeds, though "the Ark of God is under curtains;" and a small, but faithful, congregation of proselytes hear daily the evangelical verities of our Church, on the mount of the Holy City itself, in the language of the prophets, and in the spirit of the apostles. To any one who reflects on this event, it must appear one of the most striking that have occurred in modern days, perhaps in any days since the corruptions began in the Church of Christ.

It may be that it only remains for the great mass of Hebrews to turn from the error in which they have blindly persevered, from the fearful day of the crucifixion to the present, for the prophecy to be fulfilled which promises "the Lord will make Jerusalem a praise upon earth," (Isaiah LXII. 7); and it should be the prayer of every sincere Christian, that the Jew shall be enabled to see the great light of Christianity‡; which is the only sure guide to that faith by which alone he can hope to re-establish his temporal, and to secure his eternal welfare.

* *Quarterly Review*, for January, 1839, p. 178.

† Mr. DAVENPORT'S *Report from Mowraclaw*, in "*Jewish Records*," for September, 1838.

‡ "They forget a main point of the Church's glory who pray not daily for the conversion of the Jews."—ARCHBISHOP LEIGHTON'S *Sermon on Isaiah*, LX. 1.

ENGLAND IN THE OLDEN TIME.

No. XI.

MINSTRELS, JUGGLERS, AND DANCERS. 3.

WE now proceed to bring down our notice of these public exhibitors to the last century. The *Bards* or *Minstrels* had long since ceased to hold a rank in the estimation of society; we shall therefore direct our attention to exhibitors of another kind.

The *clowns* or *fools* of the present day are a remnant of a class which was much relished some centuries back. The *jester's* or *fool's dance* was a favourite diversion. These fools were men who decorated themselves out in a fantastic manner, hanging bells, &c. to their caps and clothes, as is represented in the two engravings at the head and foot of the present Article. They sometimes exercised themselves in a regular sort of dance; and at other times played antics of every kind: their object being to raise a boisterous laugh by absurdities however extravagant. There used anciently to be a *festival of fools* celebrated at Christmas time, in which the performers indulged in mockeries ill suited to the religious associations of that season.

Another dance of bygone times, and which is not yet quite in disuse, was the *morris dance*, which is supposed by some to have derived its name from the Moors or Moriscos of Spain, who had a dance in some respects similar to it. The dresses of the morris-dancers two or three centuries ago, were adorned with bells, which were not placed there merely for the sake of ornament, but were intended to sound to the measure of the dancer's feet.

These bells were of unequal sizes and differently named, such as the *fore* bell, the *second* bell, the *treble*, the *tenor*, the *great* bell. The principal dancer in the morris dance was more richly dressed than his companions.

The morris-dancers do not appear to have been of a definite number in each set or company: sometimes five, and at other times ten, exclusive of musicians, formed the company. They were also generally accompanied by a *hobby-horse*, which was a ludicrous figure, formed thus:—the resemblance of the head and tail of a horse, with a light wooden frame for the body, was attached to the person who was to perform the double character, covered with trappings reaching to the ground, so as to conceal the feet of the actor, and prevent its being seen that the supposed horse had none. Equipped in this manner, the performer was to prance about, imitating the curvettings and motions of a horse.

There was another dance in vogue called the *egg dance*, which appears to have consisted in the following feat:—a number of eggs, about twelve or fourteen, were placed at certain distances, in a stage or stand; the dancer, taking his station, was blindfolded, and

a hornpipe being played by the musicians, he went through all the paces and figures of the dance, passing backwards and forwards between the eggs, without touching or breaking any of them.

It is needless to enumerate all the grotesque dances which have from time to time been devised for the amusement of the populace; we will content ourselves with one more:—Strutt, writing in the last century, says: "A few years ago there was a fellow that used to frequent the different public-houses in the metropolis, who, mounting a table, would stand upon his head with his feet toward the ceiling, and make all the different steps of a hornpipe upon it, for the diversion of the company. His method of performing was to place a porter-pot upon the table, raised high enough for his feet to touch the ceiling when his head was upon the pot. I have been told that many publicans would not permit him to come into their houses, because he had damaged the ceiling, and in some places danced some of it down."

We have before had occasion to speak of rope-dancers two or three centuries ago; we must here allude to one of the last century, exhibited about a hundred years ago at Hertford. A rope was stretched from the top of the tower of All Saints Church, and brought obliquely to the ground at the distance of about eighty yards from the bottom of the tower, where, being drawn over two strong pieces of wood nailed across each other, it was made fast to a stake driven into the ground · two or three feather beds were then placed upon the cross timbers, to receive the performer when he descended, and to break his fall. He was also provided with a flat board, having a groove down the middle, which he attached to his breast; and when he was about to exhibit, he laid himself on the top of the rope, with his head downwards, and adjusted the groove to the rope, his legs being held by a person appointed for that purpose, until he had properly balanced himself. He was then let free, and descended with incredible velocity, from the top of the tower to the feather beds. He performed this feat three times a day; the first time he descended without holding anything in his hands; the second time he blew a trumpet; and the third, he held a pistol in each hand which he discharged as he came down. This man had lost one of his legs, and its place was supplied with a wooden leg, which was furnished on this occasion with a quantity of lead sufficient to counterpoise the weight of the other.

Still more perilous, though effected without the aid of a rope, was the feat of a Dutchman named Peter, in 1553, of whom Holinshed speaks. He "stoode upon the weathercocke of St. Paul's steeple, holding a streamer in his hands of five yards long, and waving thereof. He sometimes stood on one foot and shook the other, and then he kneeled on his knees, to the great marvell of all the people. He had made two scaffolds under him; one above the cross, having torches and streamers set upon it; and another above the ball of the cross, likewise set with streamers and torches which would not burn the wind was so great. Peter had sixteene pounds, thirteene shillinges, and foure pence, given to him by the citie for his costs and paines, and for all his stuffe." This was one of the exhibitions in honour of Queen Mary.

The last century was by no means deficient in those exhibitions of vaulting over horses, garters, wagons, &c.,—balancing straws, feathers, ladders, wheels, &c., on different parts of the body,—posturing in the most grotesque and unnatural forms, &c., which the populace of the present day occasionally run after so eagerly. Indeed there is scarcely a marvellous exhibition belonging to any of these classes, and which is occasionally witnessed at present, but what was fully equalled a century or two back.

The last remark will apply to that class of conjurors, called *fire-eaters*. There was a man named Powell, about eighty years ago, who used to eat the burning coals from the fire; he put a large bunch of matches, lighted, into his mouth, and blew the smoke of the sulphur through his nostrils; he carried a red hot heater round the room in his teeth, and broiled a piece of beef steak upon his tongue. To effect this last feat, he lighted a piece of charcoal, which he put into his mouth beneath his tongue, the beef was laid upon the top, and one of the spectators with a pair of bellows blew upon the charcoal, to prevent the heat from decreasing till the meat was sufficiently broiled. By way of conclusion he made a composition of pitch, brimstone, and other combustibles, to which he added several pieces of lead: the whole was melted in an iron ladle and then set on fire; this he called his soup, and taking it out of the ladle with a spoon of the same metal, he ate it in its state of liquefaction, and blazing furiously, without appearing to sustain the least injury. Strutt witnessed the performances of this man, and described them just as he saw them.

As a conclusion to our article we shall briefly allude to that class of persons called *mountebanks*. This was a vagrant dealer in medicines, who had set up a stage at a particular place, and vaunted forth the merits of his drugs, his travelling shop being enlivened by music, dancing, tumbling, and other non-medical performances. It need hardly be said that these men were very little better than cheats and swindlers. In the "Spectator," these mountebanks were severely ridiculed, and one of them who exhibited at Hammersmith is thus handed down to fame. "He told his audience that he had been born and bred at Hammersmith, and, having a special regard for the place of his nativity, he was determined to make a present of five shillings to as many as would accept it. The whole crowd stood agape, and ready to take the doctor at his word; when putting his hand into a long bag, as everyone was expecting his crown-piece, he drew out a handful of little packets, each of which he informed the spectators, was constantly sold for five shillings and six-pence, but that he would bate the odd five shillings to every inhabitant of that place. The whole assembly immediately closed with this generous offer, and took off all his physic, after the doctor had made them vouch that there were no foreigners among them, but that they were all Hammersmith men." What was the real value of these packets, the reader will not have much difficulty in guessing.

We here close our notice of that large class of exhibitors, who, under the names of minstrels, bards, dancers, jugglers, fools, vaulters, tumblers, mounte-

banks, &c., contributed to the amusement of our forefathers. We should do well to reflect a little how far we have improved upon bygone ages in these matters, how far we have arrived at more rational and intellectual modes of amusement. The printing-press *ought* to have made great changes in this respect; and if we admit that such changes have been made, we must also admit that much yet remains to be done. The proper dignity of the human being is scarcely consulted in the prosecution of such amusements.

ARTESIAN WELLS.

THIS name is applied to a convenient mode of obtaining water, which has come into use in recent times, and which in many cases saves a large portion of the expense necessarily attendant on digging a well. The term *Artesian* has been given to this contrivance, on account of the province of Artois, in France, having been the first place where these wells were employed, or at least where they have been most numerously constructed. The distinctive characteristic of these wells is, that they are formed by *boring* instead of *digging;* and we proceed to detail the nature of the process.

The borers generally dig a circular hole about six or eight feet in diameter and nearly as many in depth, at the spot where the well is to be situated. The workmen then attach a sort of chisel to a long handle capable of being worked by two men, and with this chisel they begin to penetrate perpendicularly into the ground: if the ground be tolerably soft, the weight of the two workmen, bearing upon the handle, and occasionally forcing it round, will soon cause the chisel to penetrate; but if the ground be hard or strong, the workmen strike the chisel down with repeated blows, so as to make an incision.

When a hole has thus begun to be formed, the chisel is removed, and a kind of cylindrical auger is attached to the cross handle, and let down into the hole: the object of this is to bring up the loose stones and rubbish that the chisel may have cut in its passage; and this is effected by a kind of valve situated within the auger.

Matters are now ready for the more extensive process of *boring*. The chisel is lengthened, by attaching an iron rod to its upper end, the top of the rod being fastened to the cross wooden handle at which the workmen are stationed. With this lengthened chisel the workmen proceed as before, either forcing it down through the ground by turning the handle and pressing upon it, or else striking it when the ground is hard and firm. When the hole is thus perforated as deep as the length of the chisel will allow, the chisel is drawn up again, removed from the rod, and the auger fixed on in its place: this auger again collects and draws up the loose rubbish resulting from the working of the chisel.

The auger is again removed, another length of iron rod screwed on, and the chisel again attached to the lower end. With this lengthened apparatus the boring is continued as far as the length will permit, after which the loose stones and dirt are removed by detaching the chisel and employing the auger in its place. Thus the workmen proceed, attaching one rod after another as they penetrate deeper into the earth, and removing the rubbish before they lengthen the line of rods. When the depth attained is considerable, the task of drawing up the rods and chisel is too laborious for the men; there is, therefore, an arrangement of levers and pulleys, or some other mechanical assistance, by which the rods are more easily drawn up.

Each rod is about six or seven feet in length; and the chisel employed is about two inches and half wide, the auger being somewhat less. After the perforation is made, another instrument is inserted in lieu of the chisel, by which the hole is widened to four inches. In some instances, however, the workmen employ, from the outset, a chisel four inches wide, by which the required width is attained at once.

The reader may now naturally inquire how far this boring is carried on? The answer is simple:—until the perforation descends to a spring of water, which suddenly rises up the hole, and flows out at the surface; and this is frequently not attained but at a depth of several hundred feet, and the boring must be continued until the proper depth is attained. When this occurs, the chisel and auger are dispensed with, and another instrument is forced down, whose shape is such as to give a smooth and cylindrical form to the bore, and thus to prepare it for the reception of a metallic pipe. The uses of such a pipe are various. The soil might be so soft as to fall in, and choke the aperture, when the instruments are removed, and the strata through which the boring is carried may contain many mineral substances which would impregnate the water derived from the spring below.

To obviate these evils, the hole is cased for a considerable depth with a metallic pipe of tin or copper, about a quarter of an inch smaller than the bore; and up through this pipe the pure spring water from below flows, and present itself, at the surface of the ground, either as a reservoir from whence water may be dipped, or as a fountain, which yma be made available in many ways.

We must now proceed to speak of the principles by which a stream of water is enabled thus to spout up through the ground, a subject which involves several points of interest.

We have many instances in nature of the tendency of fluids to assume a level surface. The water of a lake is not more elevated at one side than at another: if a pipe, open at both ends, be inserted in the water, the latter will rise to the same height within the pipe as in other parts of the lake: if bent channels of any kind be in connection with the lake at different parts, the water will rise to the same height in different parts of these channels: when we see a cistern at the top of a house in London supplied with water, we may be convinced that the water is derived from a reservoir at least as elevated as the cistern; and that the phenomenon is nothing more than an instance of a liquid maintaining its own level. Bearing this important Hydrostatic principle in mind, we shall be able to understand the nature of the source of the water which flows through an Artesian well.

Suppose a range of mountainous country, the substance of the mountain consisting of porous strata of different kinds of earth; and that a heavy shower of rain falls, perhaps of several days' continuance:—what follows? A considerable portion of the rain doubtless flows down the sides of the mountains, and forms numberless streams of greater or less extent. But there is a considerable portion which does not do so; but which penetrates into the soil, and sinks to a variable depth therein. This water is not, however, lost, merely because it appears to be absorbed by the soil: the interstices between the little grains of sand, gravel, &c., act like small tubes or channels which suffer the water to flow down from the upper to the lower parts of the mountain.

In this way we may suppose the water percolates through a porous strata to a depth of two or three hundred feet from the surface; and that at that depth it meets with a stratum of stone, of cohesive clay, or

of some other substance which will not so easily admit water to insinuate itself through it. The water, in such case, will follow the windings of the porous strata, and will descend the mountain, if the strata in question do so.

This process may, perhaps, continue for several consecutive rainy periods, until the sandy porous strata are saturated with water. There may also be a cavity in the upper part of the mountain, occasioned by some of those convulsions of nature which the geological appearances of the earth present evidence of; and this cavity would in such case be likely to be soon filled with water. We should then have a reservoir of water at the top of the mountain, and a number of minute streams of water descending from it, and passing down to the valley at the foot of the mountain; for the sandy strata of which we speak, may be carried beneath the surface soil of the valley, as well as beneath that of the mountain.

We are now in a condition to suppose the well-borer to commence his operations. He has some reasons for believing that small streams or springs of water exist beneath the surface of the valley, and he bores through the soil in the manner that we have described. At a particular depth, his boring-tools reach one of the little streams which we have supposed to flow down from the mountain; and immediately the hydrostatic principle before alluded to begins to show its mode of operation. We have, in effect, a curved channel: a reservoir high up the mountain; a continuous stream from thence to a sandy stratum a considerable distance beneath the surface of the valley; and a perpendicular cylindrical aperture from thence to the surface. Under these circumstances, the water tends to assume as high a level at one end of the channel as at the other, and thus ascends the Artesian well; and having once flowed in this direction, will continue to do so as long as any remains in the reservoir.

The suppositions which we have made in this matter are such as would seem most likely to give a clear idea on the subject; but it will, of course, be admitted that they are not always necessary:—for instance, it not necessary that the reservoir of which we speak should be in a mountain: it is sufficient that it be a little more elevated than the required height of the water in the Artesian well.

We have supposed that rain is the source of the water which supplies an Artesian well; but in practice there are great difficulties in accurately determining what is really the source from whence it proceeds. For instance, M. Arago has remarked that at the fountain at Vaucluse, in France, where the water rises much on the same principle as in an Artesian well, the quantity of water which it pours forth in a year is more than could result from all the rain which falls on a surface of ground of thirty square leagues in extent. The quantity is not always the same; at some periods being 480 cubic yards per minute, and at others nearly 1500. It is therefore imagined that the reservoir from whence it proceeds, and the natural channels through which it flows, are of a large size; and that there must be some other source of the water besides rain.

Sometimes the borers met with a reservoir of water in the course of their perforations; an instance of which is mentioned by M. Arago. Some workmen were boring a well near the Barrière de Fontainebleau, at Paris. In the course of their operations, the boring rod suddenly descended between twenty and thirty feet; and from a particular pressure which was felt upon the instrument in one direction it was evident that the boring rod was immersed in water, and subject to the action of a running stream.

Artesian wells are formed at all depths, from a few feet to upwards of a thousand; and in some cases, they yield upwards of four hundred gallons of water per minute.

It has been stated, that an Artesian well has been sunk in the great desert between Suez and Cairo in Egypt, which is likely to prove of important value. The workmen first bored to a depth of 150 feet through clay and sandstone, without meeting with any water:—they then dug in another spot to a depth of fifty feet through hard stone, but with equal want of success; but at a third spot they were so fortunate as to meet with water at a depth of only thirteen feet below the surface, in a stratum of clay covered by another stratum of calcareous sandstone.

In France, the water which spouts up through Artesian wells, is frequently made a moving power for machinery; being brought to act upon corn-mills, hammers and bellows for forging, wheels in a silk-manufactory, &c.

BAYS AND HARBOURS IN NEW ZEALAND.

The Bay of Islands is situated on the East coast of New Zealand, distant about eighty miles from the North Cape. This harbour is well known to Europeans, having been the resort, for the last forty years, of the South-Sea ships that pursue the sperm and black whale fishery in the Southern hemisphere. Marion and Crozet in 1772, and Cook in 1774, were the first Europeans that anchored in this part, and their successors have become so numerous, that, according to official reports, 250 ships now annually visit this port, and the number is still on the increase. Here are procured ample refreshments, from Europeans who have long resided on its shores, and who supply various articles of ship-chandlery, as well as from the natives, who plant potatoes, Indian corn, vegetables and fruits, and rear pigs and poultry.

Mr. Yate says, "The Bay of Islands is the largest bay on the eastern coast of New Zealand, affording good anchorage from all winds. It is a remarkably fine and capacious harbour, affording shelter for an almost unlimited number of vessels, in all weathers and all seasons of the year. The value of this harbour is much enhanced from the perfect ease and security with which vessels are able to enter it. Its width from point to point is eleven miles, affording sea-room for the largest ships to beat in when the wind is contrary; and the coast is so bold, that they may approach very near to the shore without danger. Hokianga, having a bar at its entrance, is seldom visited. The Thames is a roadstead open to the winds and waves; but when a gale blows in from the sea, vessels of 130 tons may with some difficulty be worked into the narrows, and there find secure moorings; in leaving this part of the harbour, however, without a fair wind, there would be great hazard of striking on the sands, or in the mud. The Maihia, Hicks' and Hawke's Bays, are all open, and afford no shelter that can at all be depended upon, except when the wind blows off the land. Port Nicholson, and Cloudy Bay, in Cook's Straits, have good anchorage, but none to surpass or even equal that of the Bay of Islands."

The river Waitangi is situated on the west side of the harbour; the land on the south belongs to the Church Missionary Society, and that on the opposite side is the residence and property of Mr. Busby, formerly the British official resident. The waterfall is situated at the head of the sea communication of the river, where the land rises on either side into eminences of basalt, of sufficient height to form the

barrier for the waterfall, which derives its source from an inland lake situated mid-way between Hokianga on the opposite coast, and the Bay of Islands, and after meandering in a serpentine direction through perhaps eighteen miles of a rich grain country, joined in its course by several minor rivulets of pure fresh water, dashes unceasingly over its rocky bed into the salt water below the falls.

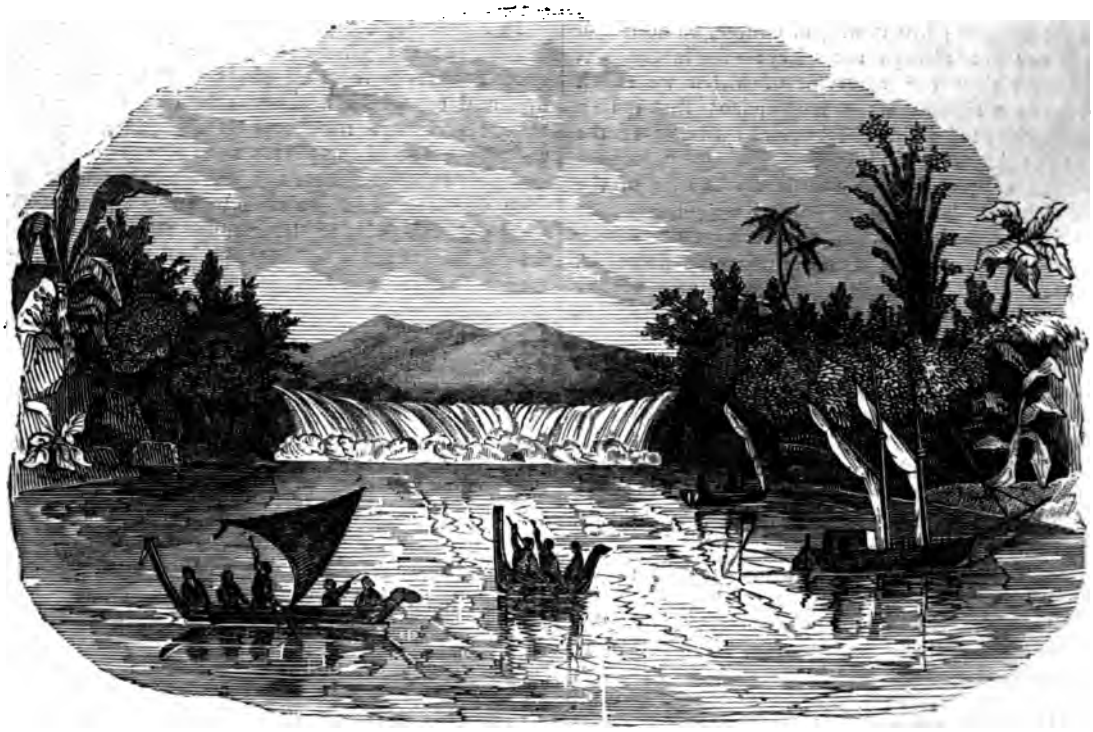
Mr. Nicholas, in his *Voyage to New Zealand in* 1814, says, "We rowed to the head of a cove where we were told there was a large waterfall. The place mentioned was not far distant from the level ground, and we found there such a powerful fall of water as would, in the event of the natives being civilized, be capable of working the largest machinery, and which thus might be made exceedingly valuable.

"In approaching the head of the cove, we discovered a natural fall, about 100 feet long and 16 feet deep, over which flowed a river, that came from some distance in the interior and discharged itself into the bay. This river, from its appearance, was never flooded, its stream being neither deep nor rapid, but flowing quietly along in a smooth and regular manner. A fall of water like this, so admirably adapted for various purposes, such as mills for grinding corn and sawing timber, would at Port Jackson be a fortune for its possessor. When the tide is at its height, there is from six to seven feet water, rising close up to the wall, and sufficient for large craft to come along-side."

Mr. Yate describes the lake as "nearly eight miles across at the widest and six at the narrowest part. From this lake proceeds the stream called the Waitangi, a narrow rapid rivulet running through several deep valleys, until it empties itself over a beautiful fall of about twenty feet perpendicular into the waters of the Bay of Islands."

Mr. Polack in his narrative of travels and adventures in New Zealand, says, "A beautiful fall of water, and from its locality an invaluable one, disembogues itself over a natural basaltic wall, 100 feet in width, and 20 feet in depth, into the salt water of the Bay of Islands. This fall is constantly jetting a heavy body of water into the river Waitangi, that has its origin in a beautiful lake of fresh water situated between the Bay of Islands and Hokianga. This lake is about seven miles in average width, forming nearly a circle, and is celebrated for large conger-eels, which are of much repute among the natives. On the north side, a few paces above the fall, is situated a beautiful flat of garden land, bounded at the back by an abrupt natural wall of singular appearance." The waterfall is admirably calculated for a succession of mill properties on an extensive scale; for flour, cotton, flax, timber, sawing, and similar machinery, as its waters never cease to flow even during the most intense heat of summer.

The rare occurrence of a natural fall of water, in the vicinity of the future capital of a country, has induced many enterprising individuals, more particularly in America, to attempt the formation of artificial ones. A work of this kind has been for some years in progress on the river Kennebec, in the state of Maine, on which two millions of dollars had been expended up to November, 1837; but though the engineering had been ably conducted, and enormous masses of stone, excavated near the spot, had been let into the dams, the works were destroyed by the heavy floods that rush down the river in the rainy season, scattering the works and destroying the bridge thrown across the river. Large blocks of stone lodged on the shallows, forming small islets, and obstructing the navigation of the river. The proposed works were intended to work mills for the manufacture of cloths, linens, and similar fabrics. The Kennebec is frozen up during six months of the year.



CASCADE IN THE WAITANGI.

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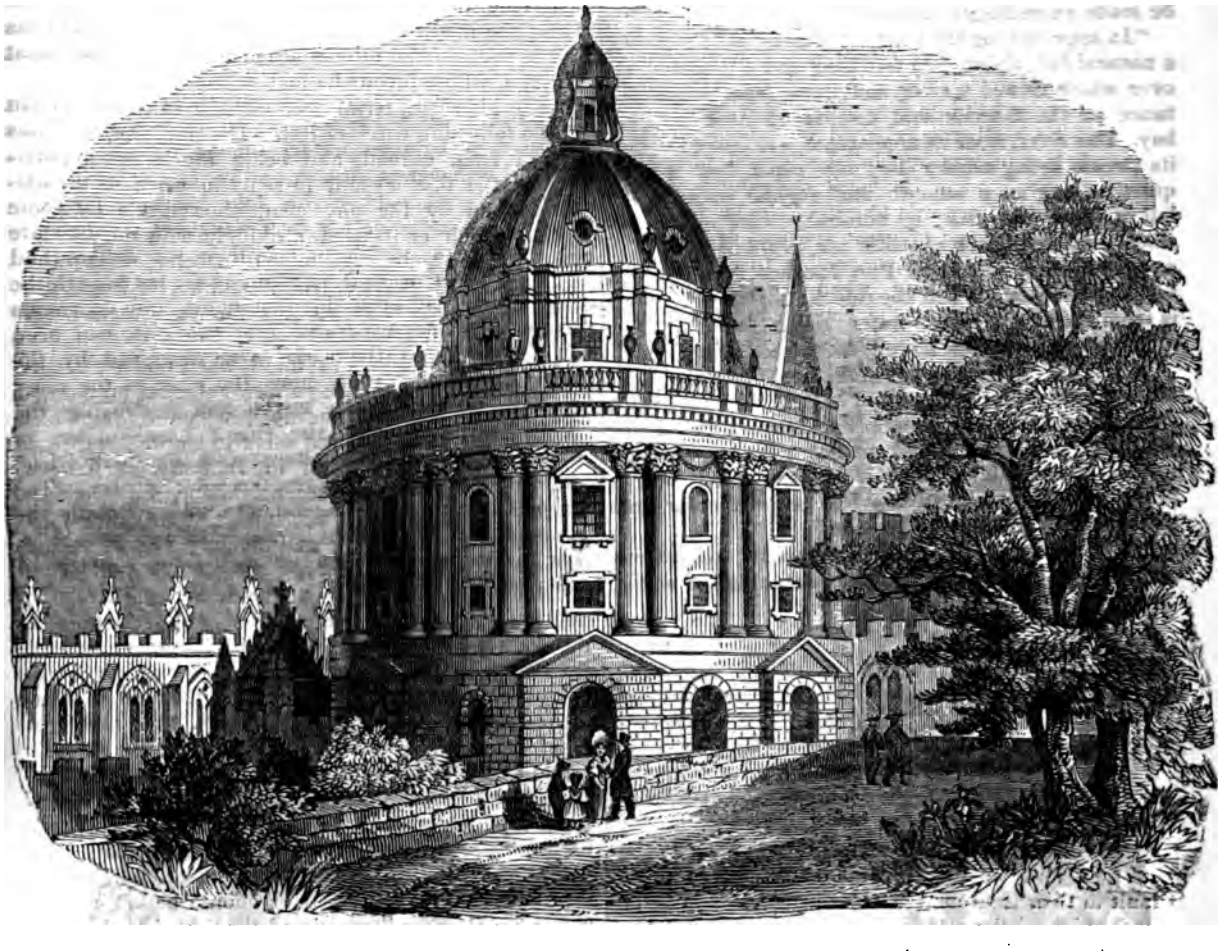


THE RADCLIFFE LIBRARY AT OXFORD.

The individual, to whom the University of Oxford is indebted for the Repository of Medical Literature, of which we have given a view above, was experienced by his own and the succeeding age, to centre in his own person the skill of the physician with the coarse wit of the buffoon; the parsimony of the miser with the liberality of a prince.

He was born in Yorkshire, in the year 1650; and having received the rudiments of his education at Wakefield and Oxford, and taken his degrees at the latter place, he directed his attention for some years to the study of medicine, and commenced practice in 1679.

Dr. John Radcliffe stands pre-eminent among the physicians of modern times, for the clearness of his judgment, which led him to perceive the vicious method then in use of treating diseases, and especially the small-pox; and for the courage with which he denounced such method, and applied his own. This, in the case of the small-pox, then a frightful and dangerous disease, was termed the *cooling* treatment. When he began the exercise of his profession at Oxford, the small-pox was raging dreadfully in the city and neighbourhood. He did not hesitate to use the new method of treatment towards all who came under his care. He gave the sick plenty of air, and ordered cooling draughts and lotions; which was a means of saving very many from impending death.

Though the *cooling* method of treatment had been already sanctioned by some distinguished names, such as Sydenham, Locke, &c.; yet, as Dr. Lydal, then the most celebrated practitioner of the University, adhered to the old practice, Radcliffe met with all sorts of opposition and discouragement from the apothecaries of the place, and others connected with the profession: until the evident results of his supe-

rior management of the sick, silenced his opponents, and made them contented to submit to, and receive instructions from him.

The circumstance of his successfully applying the new mode of treatment to Lady Spencer, at Yarnton, a little distance from Oxford, brought him into notice, among the most distinguished people of the country. This lady had been attended for a complication of disorders by Dr. Lydal, and Mr Musgrave of Oxford, without deriving much benefit from their advice. Upon sending for Radcliffe, and submitting to his treatment, she recovered, to the astonishment of all who knew her, and lived many years afterwards.

When he was about thirty-four years old, he removed to London, and rose, in the course of a year, to the top of his profession. We are told that his pleasant discourse, and ready wit, acted, in addition to his skill, as a charm, which induced all who could afford it, to resort to him for medical advice and assistance. So distinguished had he become, by the year 1686, that he was appointed principal physician to the Princess Anne of Denmark, daughter of James the Second, and afterwards Queen of England.

Having thus become of great account, at the court of James the Second, his conversion to Popery was much desired by the king, when the latter sought, about this time, to restore the English monarchy and nation to the spiritual dominion of the See of Rome. Radcliffe was accordingly visited by two of the court chaplains, and by them, and several of his Roman Catholic friends, was solicited to attach himself to the Romish faith, which had made great progress wherever the influence of the Crown reached, and which, it was vainly hoped, was making equal progress throughout the nation at large. To the credit of Radcliffe, he continued true, under all the arts of solicitation and blandishment, to the faith of the Church of England, in which he had been brought up.

When King William and Queen Mary were seated upon the English throne, Radcliffe rendered them many professional services, and was liberally rewarded. In these services he was so successful, that his fame and wealth both increased to a wonderful extent; so much so, that it is related that a neighbouring physician, Dr. Gibbons, received 1000*l.* a year from the overflow of patients who were not able to get admission to the great physician of the day.

In the year 1694 Queen Mary was seized with the small-pox, and her majesty's physicians were found at fault in their treatment of this disorder. The privy council enjoined the attendance of Radcliffe upon the queen, who, looking over the prescriptions already used for the royal patient, bluntly observed, that "her majesty was a dead woman, for it was impossible to do any good in her case, where remedies had been given that were so contrary to the nature of the distemper; yet he would endeavour to do all that lay in him to give her some ease." His method of treating the queen's case gave some hopes of her majesty's recovering; but these vanished, and she soon after died.

A short time after the death of Queen Mary, the doctor, who had been a great favourite of the Princess Anne, lost her patronage and esteem by his flippancy and rudeness, which was the result of his occasional love of drinking. It appears that her royal highness being indisposed, had caused him to be sent for; in answer to which, being then at dinner, he promised to go to St. James's soon after. As he did not make his appearance, a messenger was sent after him, to press his immediate attention, and to describe the nature of the princess's complaint. When he heard *the symptoms detailed,* he impatiently protested, that "her highness's distemper was nothing but the vapours, and that she was in as good a state of health as any woman breathing, could she but believe it." He was, in consequence of this speech, discharged from his attendance upon the princess, who conceived a violent antipathy towards him ever after; in which she only relaxed, when the urgency of the cases induced her to see him, with a view to the benefit of her dying child, the Duke of Gloucester, heir-apparent to the crown, and of her husband, Prince George of Denmark. Upon the accession of this princess to the throne, Radcliffe was recommended by his friends to the post of principal physician to the queen; but she could never be prevailed upon to receive him, observing to those who proposed the arrangement, "that she might be told again about *'the vapours.'*"

The professional attendance of Radcliffe upon King William, whose favour he had preserved till near the close of his reign, terminated likewise in consequence of the following careless jest. His majesty, having arrived from abroad, and being much indisposed, sent for the doctor; and in reply to some questions put to him by the physician, showed his swollen ankles, which contrasted strikingly with the rest of his emaciated body, exclaiming: "Doctor, what think you of these?" "Why, truly," said he, "I would not have your majesty's two legs for your three kingdoms."

The turn of Radcliffe's mind, when under any excitement, was to a coarse sort of rudeness of expression, as the following anecdote, which contains one out of many instances, will serve to show.

When the doctor lived in Bow Street, Covent Garden, he had for a close neighbour, Sir Godfrey Kneller, the king's chief portrait painter. Their gardens were contiguous, a wall dividing the one from the other. As Sir Godfrey's garden was a very rare and inviting place, owing to the many exotic plants, and the variety of flowers and shrubs abounding in it, the doctor, being very intimate with its owner, desired the liberty of having a door made, for a free intercourse with both gardens; but so as that no inconvenience should result to either family. To this proposal, Sir Godfrey politely acceded: but as the doctor's servants often strolled about in Sir Godfrey's garden, and did much mischief among its productions, constant complaints were made to their master, who took no notice of them; until, at last, he was warned by his neighbour, that, if the grievances complained of were not terminated, the door should be bricked up. "Tell Sir Godfrey," exclaimed the doctor to the footman, who delivered the message, "that he may do what he thinks fit with the door, *provided he do not paint it.*" The man, having delivered this answer to his master, was sent back to the doctor with the following: "Sir Godfrey presents his service, and sends to say, that *he can take any thing from you, but your physic.*"

Without entering into a detail of the many remarkable cures effected through the agency of Radcliffe, in the cases of persons in the highest ranks, it may be sufficient to observe, that though he was no longer admitted at court, his advice was often privately resorted to, during the progress of Queen Anne's illness. In July, 1714, she was seized with that sickness which ended her life. Now it so happened, that at that time, Radcliffe was not in London, but was confined by a fit of the gout at his country-house in Surrey. His enemies (and he probably had many, in consequence of his success, coupled with his unpleasant manners,) accused him of refusing to give his professional advice in the case of his sovereign; and it was even moved in the House of Commons, a

few days after the queen's death, that Radcliffe should be summoned to attend in his place, (for he had been elected to the House for the town of Buckingham,) in order to be censured for his neglect of her majesty. But it appeared subsequently, that neither the queen, nor the privy council, had thought of sending for him, or had even mentioned him; and that he was only sent to by Lady Masham, two hours before the queen's death. The gout had then seized his head and stomach; but he seems to have declined accompanying Lady Masham's messenger, on the ground, that he had not received "proper orders" for attending the queen; and that "her majesty's case was desperate, and her distemper incurable."

Radcliffe died about three months after the queen, in the sixty-fifth year of his age. He is said to have been a free liver, and to have regretted this in the latter part of his life, as having furnished an evil example to many of his bottle-companions. But his death is said to have been hastened by the vexation which he felt, at finding the popular feeling so strong against him, on account of his asserted negligence of the queen, that it was unsafe for him to go abroad. His body lay for some time in state, and was honoured with a public funeral at Oxford.

Besides numerous acts of individual kindness and charity, recorded by his biographers, Dr. Radcliffe spent large sums in behalf of the Society for Promoting Christian Knowledge, at the same time that, we are told, he was always hard and difficult in paying his just debts. He left large property among different institutions; but the bulk of his estates was bequeathed for the use and benefit of the University of Oxford. From money left by him, and the proceeds of his estates, were built the RADCLIFFEAN LIBRARY, the Observatory, and the Infirmary; and likewise aid has been furnished from the same source to many other charitable institutions.

The Library, of which our frontispiece furnishes a view, was planned and built in the course of about ten years. It was opened, with a public ceremony, by the trustees of Dr. Radcliffe's will, in the year 1749.

He left 40,000*l.* specially for the purchase of the ground, and the erection of this library; with 100*l.* per annum, for the purchase of books, and 150*l.* per annum, for the librarian. James Gibbs, of Aberdeen, was the architect. It stands in the centre of a square formed by St. Mary's church, the public schools, and two of the colleges. It is erected upon arcades, which, being circularly disposed, inclose a spacious dome, in the centre of which is the library itself, and into which there is an ascent by a spiral flight of steps. This building is a fine architectural ornament to the city of Oxford, whatever point of view it is seen from. By a late resolution of the trustees, the library has been appropriated to the reception of books on Medicine and Natural History.

IN some unlucky dispositions there is such an envious kind of pride, that they cannot endure that any but themselves should be set forth for excellent; so that when they hear one justly praised, they will either seek to dismount his virtues, or, if they be like a clear light, they will stab him with a *but* of detraction; as if there were something yet so foul as did obnubilate even his brightest glory. When their tongue cannot justly condemn him, they will leave him suspected by their silence.

Surely, if we considered detraction to be bred of envy, and only in deficient minds, we should find that the applauding of virtue would win us far more honour than the seeking slily to disparage it. That would show we loved what we commended; while this tells the world we grudge at what we want in ourselves.—FELTHAM.

THE PENDULUM. III.

THE two remaining papers of this series, will be devoted chiefly to the subject of COMPENSATION Pendulums; and, in order to understand their principle, we must examine a little more particularly, the construction of the common pendulum. It consists of a straight inflexible rod or wire; but as this cannot be suspended so freely and easily as a flexible body, the upper part is made of a piece of thin pliant steel spring, three or four inches long, called the *pendulum spring*; so that the whole can be suspended exactly as if it were entirely composed of string, or any other flexible body. The fixed point, to which the pendulum is attached, is called the *cock* of the pendulum, and consists of a little solid piece of metal with a narrow slit in it, as seen at c in the figure below. The pendulum-spring is drawn through this slit, which is so narrow, that it requires some force to draw the spring up or down through it; but, lest the weight of the pendulum should cause it to shift its place, it is pinched very tightly by a screw D, passing partially through the cock of the pendulum; so that the spring cannot be drawn up or down through the slit, without first relaxing the pressure of this screw. This arrangement is represented in the annexed figure.

Fig. 11.

The lower part of the rod is made to terminate in a screw, it being cut with a spiral thread for three or four inches of its length. On this screw fits a nut A, by turning which in one direction, it is of course raised, and in the other direction, lowered. This has been explained in the last article on the MECHANICAL POWERS; where it was seen that, when the screw is fixed, and the nut moveable, each revolution of the latter moves it lengthwise through a space equal to the distance between any two contiguous parts of the thread. Lastly, there is the heavy bob B, which slides freely up and down the rod; so that it would fall off, were it not supported by the nut A. By turning this nut, therefore, the bob is very slowly and gently raised or lowered at pleasure; and, as the centre of oscillation is situated in the bob, by raising it, we shorten the effective length of the pendulum; and by lowering it, we lengthen the pendulum. It is by this mode that a clock is at any time adjusted after it is made. Of course, it cannot expected, however accurately the pendulum may be constructed, that it should, after being once suspended, continue of exactly that effective length which gives just 86,400 oscillations in the period called a *mean day*. It should here be observed that the time to which clocks are adjusted, is not the same as that indicated by a sun-dial. The latter is called *apparent time*, and the apparent days and hours, as denoted by the course of the sun, are not equal in length throughout the year, owing to the complex motion of the earth. But if a year be divided into 365 equal parts, called *days*, and these again into equal parts called *hours*, this is called *mean time*. The two kinds of time only agree on four days in the year. At all other times they differ, sometimes to the amount of 16¼ minutes. This difference is called the *equation of time*; and is set down in most almanacs for every day in the year.

It is this which constitutes the difference between a sun-dial and an accurate clock or chronometer.

If, therefore, a clock be set to the time shown by a dial, and the equation of time be allowed; and if it be found, on comparing them again on the next day, that they do not keep the proper relation to each other; the screw of the pendulum must be turned a little in the proper direction, and this process must be repeated till the clock goes right.

It will be found that a very slight touch of the screw is sufficient to make a considerable difference in the rate of the clock's going. Thus, if the time of each oscillation be increased by the ten-thousandth part of a second, small as this space appears, it will in a few days produce no trifling difference in the rate of the clock; for, at the end of twenty-four hours only, the clock will have lost more than eight seconds and a half; and, although this is of no consequence in the common uses of a clock, yet in the course of weeks and months, the error will accumulate to such an extent, as to render the clock useless, until it is again regulated. Yet all this error may be produced by a difference in the length of the pendulum, which shall be far too small to be visible to the naked eye.

It appears, then, that, in a good clock or chronometer used for the purpose of astronomy or navigation, the degree of accuracy required in the length of the pendulum is almost inconceiveable. It must, therefore, be of immense importance that the pendulum should remain always ef the same length under all variations of weather or climate, to which it may be exposed. Yet it is known to every novice in science, that all bodies expand by heat, and contract by cold. However small this expansion and contract on may be, it is sufficient to make a rod of any length sensibly longer in summer than in winter; and, therefore, clocks, with common pendulums, go slower in summer, or in a hot climate, than in winter, or in a cold climate.

If any substance existed, which was not affected by heat or cold, we could easily remedy this defect, as we should only have to make a pendulum-rod of that substance. But no such substance is known; and therefore it might seem at the first view, that to remedy this defect is impossible. This opinion was formerly held by scientific clock-makers; and they therefore thought the best they could do, was, to make their pendulum rods of those substances which are affected *least* by changes of temperature; such as glass and platinum. It has been discovered, however, that by combining different substances in the same pendulum, we can make their various expansions and contractions counteract each other; so that the effective length of the pendulum remains unaltered by heat or cold. Such contrivances are called *compensation-pendulums;* and we will proceed to describe a few of them.

Fig. 12.

This figure represents the lower part of *Graham's mercurial pendulum.* The upper part resembles the common pendulum; but the rod B ends below in a *stirrup,* as represented in the engraving. Upon the *sole,* or lower flat part of the stirrup, is placed a cylindrical vessel of glass, nearly filled with mercury, which by its great weight serves for a bob to the pendulum. Now, in hot weather, the rod B lengthens, and the mass of mercury is therefore lowered, as in a common pendulum; but the mercury also expands, and that in a much greater degree than the glass of which the vessel A is made. The expansion of the mercury, therefore, causes its surface to rise, as in a thermometer. Now if the relative quantity of mercury, in proportion to the length of the rod be observed, the tendency of the expansion of the latter to *lower* the centre of the oscillation will be compensated by the *upward* expansion of the mercury; so that although the bottom or sole of the stirrup be raised and lowered as much as in the common pendulum, yet the centre of oscillation of the mass will be kept in the same place. In order to effect this, the expansion of the mercury *upwards* must be equal to the expansion of the rod *downwards.* Now, although the *length* of the rod is four or five times greater than that of the column of mercury, yet the *expansion* of the two may be equal, because mercury is so much more affected by changes of temperature than steel, the material of which the rod is commonly made.

This is, perhaps, the simplest and most elegant kind of compensation-pendulum; but, owing to the great quantity of mercury, it is very expensive, and therefore accessible only to few persons. Now it is obvious that we might produce the same result, if, instead of the cylindrical vessel A, we had a similar mass of any substance which should be much more easily affected by heat or cold, than the material of the rod. This has been taken advantage of by Mr. Baily, in the construction of a remarkably cheap compensation-pendulum, composed of wood and lead, on the same principle as the mercurial pendulum. No kind of wood was formerly thought applicable to this purpose, because, although it is but slightly affected by changes of temperature, yet the moistness of the atmosphere, by warping it, renders it nearly useless. It has been found, however, that, when a wooden rod is *gilded,* it is rendered nearly insensible to damp, and Captain Kater effected the same purpose by soaking the ends in melted sealing-wax, and giving the rod several coats of copal varnish. The *economical pendulum,* mentioned above, consists of a cylindrical rod of white deal, thus prepared, about forty-six inches long, (for seconds) and a hollow cylinder of cast lead, about 14·3 or 14·4 inches long, serving as a bob, and sliding up and down, supported on a nut, as in the common pendulum. The wooden rod is much less sensible to heat than the lead, and they therefore act in a manner analogous to the steel and mercury in the mercurial pendulum.

It has always been objected to the mercurial pendulum, that the different substances used in its construction do not absorb heat equally. If the temperature of the air be suddenly increased, the steel of the pendulum acquires that additional portion of heat much more rapidly than the glass bottle containing the mercury; consequently the pendulum cannot begin to compensate, until both the metals have acquired the same temperature: and whilst their temperature differs, there is no compensation.

To obviate this defect, a pendulum has been used, which possesses remarkable simplicity. It consists of nothing but a long glass tube, or a long-necked bottle, into which mercury is poured to the height of about five inches, to serve as a bob. The top is then closed by a brass cap, into which the spring is fixed. This is simply a mercurial pendulum, in which the rod and stirrup are of glass; the former being the neck, and the latter the body of the bottle. Now, as the outer surface of this instrument is everywhere equally thick, and of the same material (glass), every part must absorb heat equally; which they do not in the common mercurial pendulum.

We will now describe another very simple and efficient compensation-pendulum, which depends on a different principle from the others. If two bars of different substances, which are not equally affected by heat, be rivetted, or otherwise fixed, together,

there will be only one particular temperature at which they will be equal in length; for, if the temperature be raised above this point, both bars will expand, but that bar which is most sensible to heat will expand most, and will therefore be longer than the other; and if the temperature be lowered, they will both contract, but that which expanded most will also contract most, and will therefore be the shorter of the two. Now, if the two bars be fixed firmly together, so as to form a compound bar, this will only be quite straight as long as the two bars are equal. If one become longer than the other, the compound bar must bend; the shorter bar becoming concave, and the other convex; consequently, a bar of this description will be bent or *warped* in one direction by heat, and in the other by cold. Such a compound bar, made of two flat bars of brass and steel soldered together, is often used in the arts. As the brass expands and contracts more than the steel, the effect of heat is to make the brass side convex, while cold makes it concave; and there is only one particular temperature, at which the bar is straight. When such a bar is used to compensate the expansion and contraction of a common pendulum, it is fixed across the rod of the pendulum horizontally, between the bob and the middle of the pendulum, with the steel side upwards, and two weights are placed on the two ends of the bar. Now, when the pendulum-rod is lengthened by heat, the horizontal rod is warped; so that the two ends with their weights are raised. Thus the centres of gravity and oscillation of the whole mass are raised, which compensates for their being lowered by the expansion of the pendulum-rod. The contrary takes place, when by cold the rod is shortened, but the weights are lowered*.

* For further information on this subject, the reader is referred to Vol. XIV., p. 83, of this *Magazine*, or to Tomlinson's *Manual of Natural Philosophy*, at p. 605, under the article Sun-dial.

OPIUM—OPIUM-EATERS—THE OPIUM-TRADE WITH CHINA.

Besides the various inebriating liquids obtained by fermentation, and whose properties depend chiefly on the spirit of wine which they contain, there is a second class of stimulants whose narcotic properties do not depend upon any conversion of saccharine into spirituous matters. Opium stands at the head of this class of inebriating drugs. The use of opium is nearly universal from Turkey to China, and the enormous quantity consumed in the latter country is an evidence that a taste for this narcotic does not depend on the prohibition of wine to the followers of Mahomed. Even in Mussulman countries the interdict of the Prophet is little regarded by those who can obtain a supply of wine or brandy, and all classes, from the Sultan to the rayah, appear to relish fermented liquors. The use of opium, however, appears to be more in accordance with the habits of the Orientals, little given to social pleasures, and choosing rather to be inebriated alone than in company.—It is needless to investigate whether excess in the use of opium or of fermented liquors is more injurious; it appears, however, that moderation in the use of liquors is more easily observed than in the consumption of opium. Thousands indulge in the moderate use of wine, spirits or beer, for a long time, without ever committing any crimes or any way injuring health. It is different with the use of opium; a moderate dose soon loses its power, and with time the quantity used requires to be progressively augmented until the opium-eater becomes a victim to the abuse of his drug. There are very few individuals who, like the late Mr. Wilberforce, can continue the moderate use of opium during a long life.

Some of the opium-eaters can consume an immense quantity of opium without any immediately fatal consequences. Beaujoir gives an account of a Turkish Effendi, who took every day thirty cups of coffee, smoked sixty pipes of tobacco, and swallowed three drachms of opium, while his solid food consisted of only four ounces of rice. Dr. Jones, in his book, entitled *Mysteries of Opium Unveiled*, assures us that he knew of several persons in England who were in the habit of taking two, three, four, or six drachms daily; and that he heard of one that could take *two ounces in a day*, a quantity not exceeded, perhaps, in the history of man.

Baron de Tott gives a miserable picture of those who frequent the opium-market at Constantinople, describing them as having pale and melancholy countenances, with meagre necks, heads twisted to one side, back-bones distorted, shoulders drawn up to the ears, and other extraordinary appearances. Seated in the twilight of the evening or reclining on sofas in little shops ranged along the walls of the mosque of Solyman, may be seen the infatuated Hereaks, (opium-eaters,) swallowing their opium pills in proportion to the degree of want which habit has rendered necessary. Each poor votary anxiously awaits the agreeable reverie that is to follow as the effect of this indulgence. He soon returns to his home full of an imaginary happiness which neither reason nor the realities of life can procure, and in this manner each successive day witnesses a repetition of the irregularity, till, worn out with debility and intemperance, he at last sinks like a shadow into the grave.

The following anecdote, for which, however, the authority is not given, gives a curious example of the effects of immoderate habits of using opium. An English ambassador, lately sent to a Mahomedan prince, was conducted upon his arrival at the palace through several richly decorated and spacious apartments, crowded with officers arrayed in superb dresses, to a room, small in dimensions, but ornamented with the most costly and splendid furniture. The attendants withdrew. After a short interval two persons of superior mien entered the saloon, followed by state bearers, carrying under a lofty canopy a litter covered with delicate silk and the richest Cashmere shawls, upon which lay a human form, to all appearance dead, except that its head was dangling loosely from side to side as the bearers moved into the room. Two officers, holding rich filagree salvers, carried each a chalice and a vial containing a black fluid. The ambassador considered the spectacle to be connected with some court ceremony of mourning, and endeavoured to retire, but he was soon undeceived by seeing the officers holding up the head of the apparent corpse, and after gently chafing the throat and returning the tongue, which hung from a mouth relaxed and gaping, pouring some black liquor into the throat, and closing the jaws, until it sank down the passage; after six or seven times repeating the ceremony, the figure opened its eyes and shut its mouth voluntarily; it then swallowed a large portion of the black fluid, and within an hour an animated being sat on the couch with blood returning into his lips, and a feeble power of articulation. In the Persian language he addressed his visitor, and enquired the particulars of his mission. Within two hours this extraordinary person became altered, and his mind capable of arduous business. The ambassador, after apologising for the liberty, ventured to inquire into the cause of the scene he had just witnessed.

"Sir," said he, "I am an inveterate opium-taker, and I have by slow degrees fallen into this melancholy excess. But of the diurnal twenty-four periods of time, I continually pass eighteen in this reverie, unable to move or speak; I am yet conscious, and the time passes away amid pleasing fancies, nor should I ever awake from the wanderings of this state had I not the most faithful and attached attendants, whose regard and religious duty impel them to watch my pulse. As soon as my heart begins to falter, and my breathing is imperceptible except on a mirror, they immediately pour the solution of opium into my throat, and restore me as you have seen. Within four hours I shall have swallowed many ounces, and much time will not pass away ere I shall relapse into my ordinary torpor."

The mode of using opium in Turkey and China is a little different. In the former country the practice is to swallow a certain number of opium pills, proportioned to the capacity of the *theriaki*, or opium-eater. In China the opium is boiled in water, and the extract, when dried, is put into a pipe and used as we do tobacco. The employment of this demoralizing drug has grown to an evil of enormous magnitude in China; and we believe few individuals who are moderately acquainted with the circumstances of the case will disapprove of the energy with which the Chinese government have at last insisted on putting down this mischievous traffic, and still fewer who will not entertain feelings of contempt or disgust at the conduct of the East India Company, which profits so largely by this commerce, and is the only power which can effectually put it down.

The conduct of the Company is an instance of elaborate iniquity and hypocrisy. It appears from the *Chinese Repository* for 1837, that throughout all the territories within the Company's jurisdiction, the cultivation of the poppy, the preparation of this drug, and the traffic in it until it is brought to Calcutta, and sold by auction for exportation, are under a strict monopoly. Should an individual undertake the cultivation without having entered into engagements with the government to deliver the produce at the fixed rate, his property would be immediately attached, and the ryot compelled either to destroy his poppies or give security for the faithful delivery of the produce. Nay, according to a late writer, the growing of opium is compulsory on the part of the ryot. Advances are made by the government through its native servants, and if a ryot refuses the advance, the simple plan of throwing the rupees into his house is adopted. Should he attempt to abscond, the peons (police) tie the advance up in his clothes and push him into the house. The business being now settled, there being no remedy, he applies himself as he may to the fulfilment of his contract.

"The great object of the Bengal opium agency," says Dr. Butter, "is to furnish an article suitable to the peculiar tastes of the population of China. During the year 1837 the quantity of opium exported to Canton amounted to 16,916 chests, containing each about 120 lbs., and having a value of upwards of two and a half millions sterling." The amount of misery occasioned by this commerce must be enormous. The cultivation of the drug is almost compulsory on the poor Hindoo. The entire opium crop is smuggled into China, where it proves a poison to millions. The process of smuggling is thus accurately described by a Chinese magistrate:—"Here are constantly anchored seven or eight large ships, in which opium is kept, and are therefore called receiving ships. At Canton there are brokers of the drug, called *melters*. These pay the price of the drug into the hands of the resident foreigners, who give them orders for the delivery of the opium from the receiving ships. There are carrying boats plying up and down the river, and these are vulgarly called fast crabs and scrambling dragons. They are well armed with guns and other weapons, and are manned with some scores of desperadoes, who ply their oars as if they were wings to fly with. All the custom-houses and military posts which they pass are largely bribed. If they happen to encounter any of the armed cruising boats, they are so audacious as to resist, and slaughter and carnage ensues."

The enormous mischiefs of the opium-trade are sufficiently apparent to the Chinese government, which has the credit of being sincerely desirous of putting a stop to it. The matter has been discussed by the different mandarins in the most deliberate manner, and with a perfect knowledge of all the facts; the evils of smuggling, on the one hand, and of a licensed trade, on the other, are discussed in a manner which would exceed the intellectual capacities of many European statesmen. The more intelligent of the Chinese appear to be of the same opinion with their governors, as to the urgency of the evil, and the necessity of checking so enormous an abuse. Their moralists write against it, and it is the subject of illustration by their artists. In the *Chinese Repository*, there is an account of a series of paintings by a Chinese artist, illustrating the progress of the opium-eater, from health and affluence to poverty and disease; and the idea, and mode of execution, bear a striking resemblance to the Rake's Progress, by Hogarth.

We are sorry to see several attempts to mislead the public by those who appear to be interested in the traffic, and some even propose going to war with the Chinese, for the sake of the opium-trade. It is probable that few right-thinking people will feel any sympathy for the opium-merchants, or will countenance any attempt to bully the unoffending Chinese government into a free trade in this deleterious drug. Were the importation of opium abandoned, it is probable that the real and heavy grievances which the Chinese inflict on the inoffensive portion of the foreign merchants might be at length removed, and certainly they would meet with more sympathy.

Opium, like wine, stands as the type of a class of stimulants, of which many kinds are used as substitutes for the juice of the poppy. The use of various preparations of hemp is common in those countries where opium is taken, and appears in short to be the poor man's opium; the consumers of the two drugs being respectively analogous to the wine-drinkers and whiskey-drinkers of our own country. The most common preparation of hemp goes by the name of *bang*, and is exclusively used in India: its narcotic properties resemble those of opium, but are more stupefying and violent, and less permanent.

We shall only notice two other substitutes for opium, taken from two very remote countries. The Peruvians have been acquainted for a long period with the virtues of a small tree called *coca*, whose leaves possess properties resembling the effects of opium. The leaves of this plant are plucked three or four times a year, and after being carefully dried are packed in small baskets. Many chew these leaves as others do tobacco; and such is the sustenance derived from them that they frequently take no food for four or five days, although constantly working; and while they have a good supply they feel neither hunger, thirst, nor fatigue, and without any injury to health they can remain upwards of a week without the refreshment of sleep. Coca proves to the Peruvian

the highest source of gratification; for under its influence the imagination presents the most fascinating scenes. Many to indulge in its use forsake the rational associations of civilized life, and return in the evening to the woods, to revel in the uninterrupted enjoyment of its magic qualities. Prostrated under a tree, its votary, heedless of the storm, the darkness of the night, or the attacks of wild beasts, reposes happy and contented, until the morning awakes him to a sense of his own degradation, and induces him to return—a frightful picture of unnatural indulgence.

When a Peruvian starts on a journey he carries with him a small leather pouch for holding coca, and a calabash for lime or ashes of the *molle*, to mix with the coca. Thus equipped, a man will undertake to convey intelligence upwards of one hundred leagues without any other provision. These persons are termed *chosques*, or *chosqueros*, a name given to the conductors of mails. Men of this description were employed for the transmission of intelligence by the Incas long prior to the invasion of the Spaniards; and some of these couriers have been known to convey news a distance of six hundred miles in six days. The coca appears to be a kind of American opium, closely resembling the opium of the poppy in its effects, and presenting a most remarkable analogy in its history and uses with that of the Oriental drug.

A mushroom which grows in Siberia, and which is not uncommon in this country, is used as a narcotic in Kamschatka and other parts of the Russian empire. The fungus or mushroom is eaten without any preparation; and two small ones afford a moderate dose. The effects of this exhilarant have more resemblance to the intoxication produced by spirits, than to the sober, dreamy visions induced by opium. Its ordinary effects are giddiness, gaiety, a flushed countenance, and incoherent talking; it renders some very active, and proves highly stimulant to muscular exertion. Too large a dose brings on violent spasmodic affections; and such are its excitements on the nervous system, that it renders many very silly and ludicrous. If a person under its influence wish to step over a straw or small stick, he takes a stretch or jump sufficient to clear the trunk of a tree; a talkative person can neither keep silence nor secrecy; and one fond of music is perpetually singing.

[From the *Dublin University Magazine*.]

THE PHILOSOPHY OF A SOAP-BUBBLE.

No. I.

THERE are probably many of our readers, who, on referring back to the period of their childhood or youth, and calling to mind the various toys which beguiled their young hours, have regretted the totally uninstructive tendency of the wooden horse and sword, the squeaking trumpet, and the tinselled drum; and seeing many around them who have attained manhood, in utter ignorance of the tritest principles of science, have lamented such ignorance, and felt the necessity of some scientific knowledge in the general concerns of life.

Does it ever occur to such persons, that, had their toys been machines, or simple instruments employed in the mechanical arts, they would have had a better chance of imbibing a taste for useful pursuits, and of gaining knowledge, than by the use of the unmeaning, ill-constructed and expensive lumber, bearing the name of "toys," which excites delight the first day, indifference the second, and a desire to pry into its internal mechanism on the third, which curiosity generally effects the destruction of the toy? The child whose curiosity prompts it to rip open the drum, in order to see "where the sound comes from," might surely have its curiosity better excited, especially if an intelligent parent would guide its young hands to the use, and its tender mind to the appreciation, of such simple and easily-constructed apparatus and machinery as would inform the mind of valuable truths, stimulate research, and render the play-room of youth its lecture-room, not only without detracting from the cheerfulness and fun of the former, but actually rendering it more delightful, by imparting a new interest in what may still be called toys, but which in fact are toys whose use will be felt and appreciated at every subsequent period of the young pupil's life.

It is our purpose to present the reader with a few occasional articles on the Philosophy of Toys. We select the SOAP-BUBBLE for our commencement, not only on account of the extreme simplicity of this favourite childish toy, but as a most remarkable illustration of the proposition, that it requires a great deal of philosophy to observe common things. Let not the reader smile at our subject, and deem a soap-bubble unworthy his serious attention. The great Newton did not disdain to study phenomena, because they were presented to him by things which we are in the habit of calling mean, childish, and trivial: he availed himself of whatever would assist him in searching after those perfect and immutable laws, by which the Almighty governs the universe; and among other objects he directed especial attention to a SOAP-BUBBLE. We propose therefore to consider, *first*, the phenomena exhibited by soap-bubbles; *secondly*, some other phenomena depending on the same causes, and bearing a strong relation to them; and *thirdly*, we will endeavour to present a popular view of the natural laws which influence the production of these phenomena.

1. OPTICAL PHENOMENA OF A SOAP-BUBBLE.

It is generally known that bubbles of every description, whether formed by shaking a liquid, or by blowing the bubbles with a tobacco-pipe, are thin films of liquid, inflated into a globular shape by air, or some other gaseous body; and that such films, when much distended with air, appear covered with very beautiful colours, resembling those of the rainbow. They depend for this solely on their *thinness*, and these colours are therefore called the *colours of thin plates*; for they are not confined to films of fluids, but very thin plates of any transparent body also exhibit them. The usual globular form of bubbles has nothing to do with these colours, for a plain film will show them as well as a convex surface. Such a film may be formed by dipping the mouth of a wine-glass into a tenacious liquid, when, on taking it out, and holding it horizontally, a flat film will be seen to cover the mouth, which will exhibit various brilliant colours, increasing in beauty as the film becomes thinner, till at length it bursts.

The reasons why the film becomes thinner and thinner, are, *first*, the continued evaporation from its surface, and, *secondly*, the continued draining of its substance, which descends by its gravity to the lowermost part. When a bubble becomes exceedingly thin, the slightest breath, or commotion of the air, is apt to destroy it. This cause of evanescence may be removed, and the duration of the bubble prolonged, by placing it under a convenient glass cover. The length of time during which the bubble remains also depends on the tenacity of the fluid; because the more tenacious or viscid the fluid is, the thinner can its films be made, without bursting. Water is not

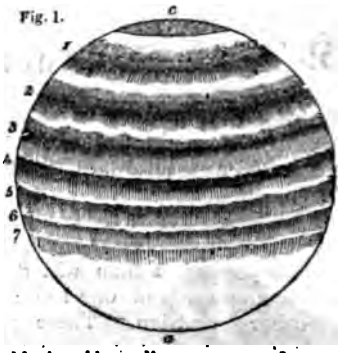
sufficiently viscid; for its bubbles will not hold for any time together, and drain to a sufficient degree of thinness to show colours. The film could not support its own weight at such a degree of thinness; but the tenacity of water may be increased by the addition of soap, to dissolve which the water must be tolerably pure. Soap dissolved in rain-water forms a lather, or solution of soap, which is the most convenient liquid for forming bubbles, and its tenacity may be increased, so as to form still larger and more durable bubbles, by adding to the lather a little isinglass. Still however we have not described the mode of producing a *permanent bubble*, and such a bubble is absolutely necessary, in order to study the phenomena presented by it; for though bubbles formed in the common way may last a considerable time, yet we can never be certain of their remaining more than a few seconds, and they seldom remain quite long enough to exhibit the whole series of tints, as they generally burst at the moment when the most important part of the observation is beginning. The way to produce a permanent bubble, which may remain for a considerable time, is to form it *in vacuo*, and the best apparatus for effecting this may be thus easily prepared.

Take a phial about the size of the apothecary's six ounce phials, or about 1½ inch in diameter. Fill it about one third full of distilled or rain water; immerse it in a vessel of cold water, and place the whole upon the fire till the water both within and without the phial boils, and steam issues from the mouth of the phial, which will not crack unless the fire be very strong. Now, while a jet of steam is rushing out of the phial's mouth throw in a bit of soap about as big as a pea, cork it, and instantly remove the vessel from the fire, otherwise the steam in the phial continuing to be generated, will either blow out the cork or burst the phial. Push in the cork very tight, and melt a thick layer of sealing wax over it; this will prevent air from entering through the pores of the cork. Keep the phial in the hot water, and let it cool gradually, lest the change of temperature should crack the bottle. When cold it is ready for use.

We have now a bottle containing lather, and a vacuum, which, if well made, is more perfect than could be made by the best air-pump. This cheap and simple apparatus, when once prepared, will remain perfect for a long time; and a good thin film can at any time be made by holding the bottle horizontally, and giving it a sudden jerk, by which the liquid will be thrown upwards, and touching the upper interior surface of the phial, will, on returning, leave a flat circular film, or plate, extending quite across the inside of the bottle; and on placing the bottle upright, the film will be nearly, though never quite, horizontal. Perhaps, two or three films will be produced; but these will be of no inconvenience. In order to observe the colours of the film, we must place the bottle close to the window, so as to have the uninterrupted light of the sky reflected from the film; and the bottle must not be touched during the whole observation.

At first, the film will be white, being then too thick to exhibit any colour; and merely reflecting the light; but in a minute or two it will appear much agitated by currents descending from the highest to the lowest part of the film, and thence trickling down the inner surface of the bottle into the mass of liquid below. At the same time, spots of the most gorgeous and exquisite tints will be formed on the surface of the film, which will ascend from various parts towards the crest or highest point, where, collecting together, they will arrange themselves into seven coloured arches, or little concentric bows, which will dilate and expand till they almost cover the surface of the film, which will then present the appearance of the following figure.

Fig. 1.



1st arch:—black, white, yellow, orange, red.
2nd arch:—purple, blue, white, yellow, red.
3rd arch:—purple, blue, green, white, red.
4th arch:—purple, blue, green, white, red.
5th arch:—greenish blue, pale red.
6th arch:—pale sea green, pink.
7th arch:—very pale green, reddish white.

The space beyond this is white, being too thick to appear coloured; but as the requisite thinness extends downwards over the film, which becomes thinner by draining, the arches enlarge, and, as it were, push each other forward from *c* towards *a*, till the seventh arch disappears at *a*, as if it went out of the bottle. The film is then completely covered with colours; but has only six arches. As these advance towards *a*, expanding as they advance, the sixth arch also vanishes, as if it had been pushed out by the enlargement of the others. Then the fifth follows, and so on, till the first arch only remains, occupying the whole surface of the film, which is then divided into five broad bands, black, white, yellow, orange, and red. Of these, the red first vanishes at *a*; then the orange; and then the yellow; so that the film is at length divided into two nearly equal portions, black and white.

The colours described above are of the most gorgeous description, such as no art can imitate; for they are sketched by the pencil of nature, and the eye lingers over them with delight. Although, in the table, the same name, such as *red*, *purple*, &c., is repeated several times, yet there are in fact no two colours alike; but each red, each purple, &c., possesses a character peculiar to itself. All the colours melt gradually into each other, except the black and white, which are separated by a distinct and well defined line. The different colours of the first, second and third arches, which are always the most brilliant, are, of course, most distinctly seen towards the close of the observation, when they expand into broad stripes, while at the beginning they are too close together to be well observed. It should be stated that the *black* is the extreme of thinness; and that each colour corresponds with a particular thickness, as we shall hereafter endeavour to prove.

The whole time taken up by the process described above is from twenty minutes to an hour; after which the black space continually enlarges, till the film is too thin to support itself. Its whole duration is sometimes as much as 24 hours; at the end of which period the film represents somewhat the appearance of a new moon, for the black part greatly exceeds the white one. The slightest disturbance of the bottle, however, destroys it.

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THE BANKS OF THE BLACKWATER, SOUTH OF IRELAND.

BRIDGE ON THE BLACKWATER.

THERE are many rivers which bear the name of Blackwater. England has one, Scotland three, and Ireland no less than five.

The chief of those in Ireland is a very considerable stream in the southern part of the island, and forms the subject of the present notice. This river takes its rise in the mountains which separate the counties of Limerick and Kerry, and forms part of the boundary between the latter county and that of Cork. It then passes the foot of the *Slieve-logher* mountain, where it obtains a large accession to its waters, and flows on in a westerly course, across the northern part of the county of Cork, for a distance of about forty-five miles. It then enters Waterford, and has a very winding course ere it reaches the sea. At the town of Cappoquin it becomes navigable, and after receiving the waters of the river Bride, it opens into two or three spacious loughs, and flows into the sea a little below the town of Youghall.

The banks of the Blackwater present a succession of beautiful and picturesque scenery, and such as it would be impossible fully to describe within these limits, but we may notice some interesting spots, in the course of the windings of the river. Beginning with the mountains where it takes its rise, we come to a ravine, (the spot represented above) where the waters of our river having been swelled by little accessory streams, fall with rapid course through a deep channel, and are spanned by a high and very picturesque bridge of two arches. Here the boldness of the rocks, the depth of the shades, and the beautiful fringe of oak and ash-trees on the banks, form a scene which can scarcely be surpassed in any foreign country. The enthusiastic praise which is justly given to the scenery of the banks of the Danube, the Rhine, or the Rhone, by those who have visited the neighbourhood of those beautiful rivers, is too apt to depreciate in our estimation the beauties of our own country. Instead of turning our attention to the lovely and interesting scenes with which our own and the sister island everywhere abound, we sometimes roam far and wide, to seek for pleasures and novelties which could just as well be gained at home. A popular writer of the present day declares, that, with the descent of foreign rivers fully in his recollection, he does not think the descent of the Blackwater is surpassed by any of them.

In its course along the northern part of Cork, the Blackwater receives the waters of several tributary streams, among which are the Allo, Awbeg, and Tuncheon. The first town at which it arrives is that of Mallow, in the county of Cork, where stood the

celebrated castle of the earls of Desmond, destroyed during the Rebellion of 1641. The chief attraction to this town at present arises from its spring of tepid water, gushing from a limestone rock, which, from the fame of its medicinal qualities, usually collects a numerous assemblage of visiters during the summer season. An excellent stone bridge crosses the river at this town.

Before the river leaves Cork, it passes another town of that county, where it has a fine bridge of thirteen arches built over its stream. This town is Fermoy, the history of which is too singular to remain unnoticed. No longer ago than in the year 1791, Fermoy was but an obscure village, with few inhabitants; yet, through the exertions of a spirited individual, it has now become a handsome and opulent town. A gentleman of the name of Anderson was the person to whom Fermoy is so much indebted: he projected a new town there, and being seconded by the government in his laudable undertaking, he caused the old houses to be taken down, and new edifices erected, so as to raise the village into its present considerable importance among the towns of that county. It has now a population of four thousand persons, who are engaged in manufactures and agriculture.

A few miles below Fermoy the Blackwater enters the county of Waterford. A finely cultivated country extends along the right bank of the river, and on the opposite side it is adorned by many handsome seats, which are beautifully situated, and generally embosomed in wood. As it approaches the castle of Lismore, the river becomes more winding, and its scenery more picturesque. We cannot do better than give Mr. Inglis's description of the landscape:—

As for the natural beauties of Lismore, they are scarcely to be surpassed. The Blackwater, both above and below the bridge which leads into the town, flows through one of the most verdant of valleys, just wide enough to show its greenness and fertility, and diversified by noble single trees, and fine groups. The banks bounding this valley are in some places thickly covered, in other places lightly shaded, with wood. Then there is the bridge itself, and the castle—gray and massive, with its ruined and ivy-grown towers, and the beautiful tapering spire of the church, and the deep-wooded lateral dells, that carry to the Blackwater its tributary streams. Nothing I say can surpass in richness and beauty, the view from the bridge, when at evening the deep woods, and the gray castle, and the still river, are left in shade; while the sun streaming up the valley, gilds all the softer slopes and swells that lie opposite.

Opposite the town of Lismore the Blackwater is joined by the Owenshad, a rapid mountain-stream; and these augmented waters are crossed by a handsome bridge erected by the late Duke of Devonshire, at a cost of 9000*l*. The castle of Lismore is a magnificent building, erected by King John, in 1185, and greatly added to by the first Earl of Cork. It stands on a rocky elevation at the height of nearly 100 feet above the river. The pleasure-grounds which surround this castle are remarkable for handsome and ancient trees, especially an avenue of yews, and some splendid groups of ash trees. But not only in the immediate vicinity of the castle, is the scene rich and lovely: in whatever direction Lismore is traversed, the landscape presents the most varied and delightful appearance.

Between Lismore and Cappoquin, a small town just at the bend of the river, the banks of the Blackwater display striking beauties, indeed the whole of its remaining course is exceedingly diversified and picturesque.

At Cappoquin, as we have before stated, the river becomes navigable, and after passing the little town of Tallagh, and the more considerable one of Youghall, *it finally reaches the sea.* Youghall is an object of much interest, seated as it is at the foot of a richly wooded hill, having a fine sea beach, and a noble bay, and bearing marks in many of its buildings of a high degree of antiquity. The collegiate church, which was formerly one of the finest specimens in Ireland of that style of pointed architecture now called "the decorated English style," is in a ruinous state.

The nave is used as a parish church, but the chancel, which is twenty-nine feet wide, is unroofed and dilapidated. One window remains entire, and is extremely beautiful. It is divided into two compartments, each of which contains two slender mullions, terminating in open tracery and a trefoil ornament; these compartments become one by the exterior line of their arches meeting in a common point over the double massive mullion which forms a centre; and the diamond shaped space which thus remains is occupied by a Catherine wheel. The churchyard is very large and finely situated: it is interspersed with trees and has many marks of antiquity in keeping with its fine ruins, such as ancient tombs, walls covered with venerable ivy and mossy stones.

Youghall is principally supported by its export and shipping trade, which chiefly consists of corn and and cattle. The imports are timber, culm, and coal. The trade of this place is said to be increasing, but the strong disposition which exists among the people for emigration, does not say much for the flourishing state of the town, or its vicinity.

Before we leave Youghall we must give a passing notice to the residence of Sir Walter Raleigh, which has existed almost without change or decay from the time of that highly gifted but unfortunate individual to the present day. Raleigh was one of the persons to whom grants of land in Ireland were assigned by Queen Elizabeth, in order to the better cultivation of that country. His portion amounted to 12,000 acres, and Youghall and Lismore were included within its limits, but owing to his constant employment in England, he was not able to improve this extensive tract of land in a manner answerable to his wishes. Yet he did not spare his private fortune in the attempt; by re-enclosing the lands laid waste by war, and encouraging the people to return to their farms and villages, he became the benefactor of many, and left traces of his usefulness and activity. There is an interesting memorial of him at Lismore, in a free school founded at his expense, while at Youghall, where his house and gardens are, "that love of shrubs and sweet smelling plants, and that elegant taste in his rural occupations, which remarkably distinguished him," are brought to remembrance by the large and beautiful myrtles near the house, some of which are twenty feet in height. Raleigh sold his estate in Ireland to Mr. Richard Boyle, afterwards Earl of Cork. The house which was Sir Walter's place of residence, when in Ireland, is now known by the name of Myrtle Grove. The interior is wainscotted with oak, and exhibits some fine specimens of carving. In the whole building no other change has been made from its original appearance than in the style of the windows, so that this interesting spot may be considered as having had a remarkable escape from the effects of that taste for modernization, which has destroyed or disfigured many a beautiful relic of former days. In the course of repairs on this house a Bible is said to have been found, built up in the wall, bearing date only thirty-four years after the invention of printing.

Having thus followed the Blackwater from its rise in the mountains to its termination in the bay of Youghall, though without describing half the beauties of scenery which enliven the neighbourhood of its

fertilizing waters, we conclude with a beautiful comparison, drawn by one who was peculiarly gifted in deriving a useful lesson from natural objects and common occurrences.

The lapse of time and rivers is the same,
Both speed their journey with a restless stream;
The silent pace with which they steal away,
No wealth can bribe, no prayers persuade to stay;
Alike irrevocable both when past,
And a wide ocean swallows both at last.
Though each resemble each in every part,
A difference strikes at length the musing heart:
Streams never flow in vain; where streams abound,
How laughs the land with various plenty crowned!
But time, that should enrich the nobler mind,
Neglected leaves a weary waste behind.—COWPER.

THE ORDER OF KNIGHTS OF THE BATH.

I.

In almost every country of Europe, a custom has prevailed for a greater or less period, of instituting and maintaining Orders of Knighthood, admission to to which is considered an honorary reward to those who have rendered services, either to the country or to the monarch individually. There are two ways of accounting for the general diffusion of this custom: 1st. There is a love of rank and distinction apparently planted in our very nature, which is gratified by any marks of favour bestowed by those whom we acknowledge as our superiors: 2nd. There are but few sovereigns so wealthy as to be able to bestow pecuniary rewards on all those whom they wish to distinguish; and they, therefore, avail themselves of a species of reward which, while it gratifies the individual who receives it, costs nothing to the sovereign who gives it. It is probable that both these circumstances combined are to be considered as the sources of the custom.

Among the orders of knighthood which have thus been established in England, one of the most ancient is that of the *Bath*, which is supposed to have derived its name from the ancient custom of bathing previous to the ceremony of installation. As to the precise date when this order of knighthood was established no evidence now remains; but the first mention of it in English history occurs in the year 1399, when knights of the Bath are said to have assisted at the coronation of Henry the Fourth. Froissart says:—"The Saturday before his coronation he departed from Westminster, and rode to the tower of London, with a great number; and that night all such esquires as should be made knights the next day, watched, who were to the number of forty-six. Every esquire had his own bagne (*bath*) by himself; and the next day the Duke of Lancaster made them all knights, at the mass-time. Then had they long coats with straight sleeves, furred with mynever, like prelates, with white laces hanging on their shoulders."

The purpose of *bathing*, previous to the act of installation, seems to have been, "to signify that such as were admitted to this degree should be of a pure mind and honest intentions,—be willing to contend with any dangers or difficulties in the cause of virtue,—take care, both in their words and actions, to follow the maxims of prudence,—and on all occasions, religiously observe the motto of the order, *Tria juncta in uno*, which implied a true belief in the Trinity."

It became customary to create knights of this order on state occasions,—such as the accession or marriage of the sovereign,—the inauguration of the heir to the throne,—the royal birth-days, &c. Henry the Fifth, to celebrate the capture of the town of Caën, in Normandy, created sixteen knights of the Bath. All the successive monarchs from Henry the Fifth to Charles the Second, conferred this honour on some of their subjects; the last-named monarch creating no less a number than sixty-eight, on the occasion of his coronation. But from that time the order appears to have been discontinued, or to have lain dormant, for many years, until the reign of George the First.

In 1725, the last-named monarch issued a proclamation, in which, after stating the former existence of that order of knighthood, it is announced that "We do hereby declare our royal intention not only to re-establish and support the said order of knighthood in its former lustre and dignity, but to erect the same into a regular military order." This order was to consist of a grand master and thirty-six companions; and the statutes were to be made from time to time by the sovereign himself. The order was to have a seal, "which shall be immediately engraven, having upon one side the representation of our royal person, on horse-back in armour, the shield azure, three imperial crowns, or the arms usually inscribed to the renowned King Arthur, with this circumscription, *Sigillum Honoratissimi Ordinis Militaris de Balneo*, and on the reverse, the same arms impaling our royal arms." The officers of the order were to be a dean, a genealogist, a king at arms, a registrar, a secretary, an usher, and a messenger. The dean of Westminster was, by virtue of that office, to be dean of the order; while the other five officers were to be appointed by the grand master; and the fees to be paid to the officers by the companions of the order were laid down in the statutes.

The decorations of the order were strictly specified. The badge is a rose, thistle, and shamrock, issuing from a sceptre between three imperial crowns, surrounded with the motto, *Tria juncta in uno;* the whole of pure gold, chased and pierced, and is worn by the knight elect, pendent from a red ribbon across the right shoulder. The collar is of gold, weighing thirty troy ounces, and is composed of nine imperial crowns, and eight roses, thistles, and shamrocks, issuing from a sceptre, enamelled in their proper colours, tied, or linked together, with seventeen gold knots, enamelled white, having the badge of the order pendent thereto. The star consists of three imperial crowns of gold, surrounded by the motto upon a circle of red, with rays issuing from the silver centre, forming a star, and is embroidered upon the left side of the upper garment.

The dresses of the knights and officers were also laid down by rule. The installation dress of a knight is a surcoat of white satin, with a mantle of crimson satin, lined with white, tied at the neck with a cordon of crimson silk and gold, with gold tassels, and on the left shoulder is embroidered the star of the order; a white silk hat, adorned with a standing plume of white ostrich feathers; white leather boots, edged and heeled; crimson and gold spurs; a sword in a white leather scabbard, with cross hilts of gold. The dean of the order has a mantle and cord, the same as those of the knights, with the badge of the order, but no collar. The genealogist, king of arms, registrar, secretary, and usher, have white satin mantles, or robes, lined with crimson, having on the right shoulder the badge of the order, tied about the neck with a cordon, the same as the knight's; under it is a surtout like the esquire's, with a gold chain about their necks, to which is pendent an escutcheon of gold, with the badge of the order enamelled on it.

The knights are invested with the order previous

to installation. The ceremony of investiture is thus laid down. The dean, the knights, and the officers of the order, attend in the privy chamber, in their mantles and collars; and proceed from thence, after the levee, into the sovereign's presence, making the usual reverence, in the following order:—Gentleman usher of the order, in his mantle, chain, and badge; registrar and secretary of the order, in their mantles, chains, and badges; king of arms, in his mantle, chain, and badge, bearing the sceptre of the order, and carrying the ribbon and badge of the order on a crimson velvet cushion; the genealogist, in his mantle, chain, and badge; the knights of the order, in their mantles, collars, and badges; the dean of the order, in his mantle, chain, and badge; the first knight and principal companion acting as grand master. Then, by his majesty's command, the intended knight is introduced between two of the junior knights, preceded by the gentleman usher of the order. The sword of state is then delivered to the sovereign by the second knight of the order in seniority, and the intended knight is knighted therewith. Then the principal knight companion presents the ribbon and badge to the sovereign, and his majesty puts it over the new knight's right shoulder; who, being thus invested, has the honour to kiss the king's hand. The procession then returns to the privy chamber, in the same order as before. After the investiture, the knight wears only the ribbon and badge, as he cannot wear either the collar or star before his being installed, without a letter of dispensation, which is only granted to those on foreign service.

When an installation is held, each knight is allowed three esquires, who must, by the statutes of the order, be "gentlemen of blood, bearing coat-armour." They precede their knight in the procession; having for their dress a crimson silk waistcoat, with sleeves, breeches, stockings, and shoes with roses; the whole of which are silk, of the same colour, with a surcoat of white silk, lined and edged with crimson, a plain escutcheon of the order on the right shoulder of the surcoat, and a black silk hat or coif. These esquires, besides other privileges, are exempted from serving the office of high sheriff, or any parochial office.

When George the First revived the order, he allowed Henry the Seventh's chapel, in Westminster Abbey, to be the chapel of the order; and ordained, that each knight's banner, which shall be placed over his stall, shall be two yards in length, and one yard three-quarters in breadth, fringed about with red and white silk; and that, in the lowest margin, the name and title of the knight shall be inscribed with letters of gold upon a black ground; and that the crest, helmet, and sword shall likewise be affixed to the stall, together with an escutcheon of his arms and supporters, enamelled within a circle, having thereon the motto of the order in letters of gold. The arms also of his three esquires are to be enamelled on one plate, with their names and titles affixed.

There was an installation of knights of the Bath, under circumstances of much magnificence, held in 1803; but we must reserve a description of this for another article; in which we shall also have to speak of the changes made in the order in the year 1815.

PHILOSOPHY OF A SOAP-BUBBLE. II.

Optical Phenomena of a Soap-Bubble.

We shall now make a few more remarks on the permanent bubble described in the last article, and then detail some other phenomena of thin plates.

Of course, the highest point of the bubble is always the thinnest, because the superfluous liquor is always draining, by its gravity, towards the lowest point. Hence, if the reader remember that each colour is the result of a peculiar degree of thinness, and that the black is the extreme of thinness, he will easily understand how the black spot always appears at the highest or thinnest part, and how the other colours are arranged in stripes across the wedge-shaped film or plate. He will also see how, as every part of the film becomes thinner, the stripes advance, and expand as they advance, until no part of the film is thick enough to show the seventh order of colours; and therefore it departs. Even the thickest part of the wedge is then thin enough to exhibit the sixth order; and thus, as it becomes thinner, they all successively vanish, as if they went out of the bottle at the lowest and thickest part of the film. Now, as the comparative thinness of every point of the film depends on its height, it follows that, if a film were formed resembling a basin, or concave above and convex below, (which often happens,) such a film would be thickest in the centre and thinnest at the edge; and the colours would be arranged in rings, the black ring being at the edge, and all the other rings arranged within it, with a white space in the centre; that being the lowest and thickest part. Also, if a bubble were made in the shape of a dome, or the former bubble were inverted, the colours would also be in rings, but their order reversed. There would be a black spot in the middle or highest and thinnest point; and the various orders of colours would form concentric rings round it; getting fainter towards the edge, with a white ring round the base of the dome. These rings would, in the latter case, expand from the centre, as the film drained thinner, and first the seventh order, then the sixth, and so on, would vanish at the edge; while the black spot and remaining colours would go on expanding till the film burst. All this agrees with the facts. Now, in the common film produced by the bottle, as described at first, the arches are but *portions of rings* like those produced by the dome-shaped bubble. The film is, in fact, a piece of such a bubble; and the arches, if continued, would form concentric rings, surrounding, as their centre, an imaginary point outside the bottle; but in the plane of the film, if extended, and answering to the summit of a dome, of which the film is a part.

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2. The reader will now naturally inquire how plates of other transparent substances can be made so thin, as to exhibit the same colours as soap-bubbles. This can seldom be done with *solid* bodies; but we will give a few instances of it.

Glass may be blown so exceedingly thin as to show the colours of thin plates, but only very imperfectly; and such thin pieces of all solid bodies, when not firmly adhering to other surfaces, are intangible, and almost as *ghostly* and evanescent as the soap-bubble. Mica, which is a mineral of a laminated structure, or easily split in one direction, into very thin layers, is a much fitter substance than glass. Leaves of it have often been obtained so thin as to exhibit bright colours; and, (what is much more remarkable,) so equally thin as to exhibit the same colour all over their surface. We are not aware, however, that a plate of any solid body has ever been obtained so thin as to appear black, except on two occasions, when accident accomplished what art could not. On both these occasions, a quartz crystal was accidentally broken in two, and both the surfaces of the fracture appeared perfectly black, which was found to be owing to an excessively fine down of slender filaments, or scales, which acted like thin plates. It is said that

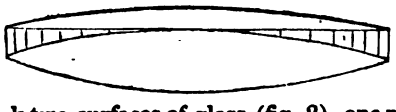
coloured thin plates of mica may sometimes be obtained by sticking a piece of mica and a piece of black sealing-wax together, and then tearing them suddenly asunder, when some very thin films will be left on the sealing-wax. Most persons must have observed, that pieces of glass, especially bottle-glass, when exposed for years to the action of the weather, become covered with beautiful colours. This is owing to the metals, lead, iron, and manganese, which are contained in the glass, becoming oxidized; and thus a very thin film of oxide (which when very thin is transparent,) is formed on the surface of the glass, to which it adheres so firmly that it cannot be scraped off, and thus becomes a thin plate, showing different colours according to its thinness.

To this class also, are to be referred the colours formed in the same manner on various metals, especially silver, when long exposed to air and damp; being likewise due to thin films of oxide, rust, or tarnish. Of this kind are the colours seen on steel during the process of tempering, which guide the experienced workman, who knows what particular tint corresponds with a particular degree of temper. The gradual increase of the heat thickens the film of oxide, and thus varies the colour. These colours are numerous and splendid; the blue colour of watch-springs is one of them.

Fluids can be made so thin as to exhibit colour, by many other modes besides that of blowing them into bubbles. Take a plate of glass, or a looking-glass, or what is still better, a piece of glass with the hinder surface painted black. Hold it so as to see the sky reflected from it, wet the upper surface, and gently wipe off the moisture, which will be reduced in many parts to such a thinness as to show bright colours, but not arranged in any particular order. Another mode of forming thin plates of fluid is to let fall a drop of an oily substance, as oil of turpentine, on the surface of water. Some substances, as balsam of Peru, instantly spread out into a layer so thin as to exhibit colour; but others, as oil of turpentine, spread out into a very thin film, but not thin enough to become coloured. In this case, beautiful coloured rings may be formed by holding just above, but not touching, the film, the tip of the finger dipped in sulphuric ether. The vapour of this very volatile substance repels the film of oil, so as to produce a cup-shaped cavity just under the finger. The middle, or thinnest part, is so thin as to be black; and around it are rings of colours depending on the increasing thickness of the film. This experiment is due to Mr. Tomlinson, in whose *Manual of Natural Philosophy*, (Article, SOAP-BUBBLE,) many other novel and striking experiments connected with the colours of liquid films may be found.

Air and *gases* are easily reduced to thin coloured plates, by enclosing them between solid surfaces almost in contact. This was the method used by Newton, in forming a plate of air, to serve instead of a soap-bubble, in investigating the doctrine of thin plates.

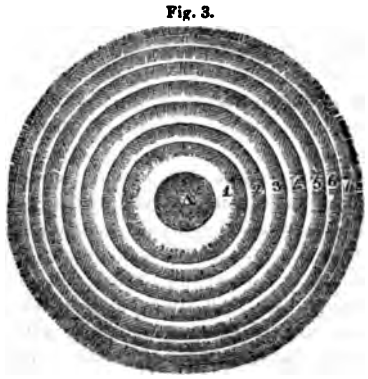
Fig. 2.



He took two surfaces of glass (fig. 2), one perfectly plane, and the other convex, with a radius of fifty feet, *i.e.*, this latter surface had a curve so exceedingly small, that the sphere, if complete, would have been 100 feet in diameter. It was one of the surfaces of a large object-glass for a telescope, and its convexity was, of course, nearly imperceptible. For the other plane surface, he did not take a piece of common glass, for that is seldom perfectly plane; but he used the plane side of another telescope-lens, which had been ground as flat as art could make it. For the reader, however, who wishes to see, on a small scale, these phenomena, it will be enough to take a common spectacle or reading-glass, and lay it on a piece of common window-glass rubbed perfectly clean. He must not look through the two glasses; but hold them (either side upwards) in such a way as to see the sky reflected from them. If he then press them very tightly together, he will see, in the centre of the glass, a round black spot about as large as a peppercorn, and as he slightly varies the pressure of his fingers, it will appear to run about between the glasses. If he looks more closely at it, (or uses a small magnifying glass to look at it,) he will see six or seven small rings round the spot; but they will be too fine for him to distinguish any colours. These are called "Newton's rings," and with Newton's more perfect apparatus, they were some inches in diameter, and glowed with the brilliant hues of thin plates, arranged as in a soap-bubble, thinner at the centre than at the edges.

The annexed figure (fig. 3,) shows the arrangement of these celebrated rings; A being the black spot, and the figures indicating the order of the rings.

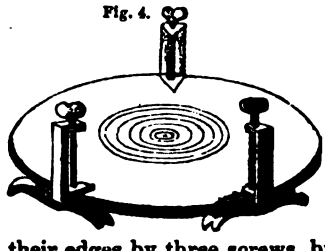
Fig. 3.



The reader will at once perceive the secondary cause of this phenomenon; for the law, which is the primary cause of all these phenomena, we have not yet explained. The two glasses are in contact at the centre only, and even there the contact is not perfect; for modern science proves perfect contact to be impossible. The plate of air enclosed between the lenses is, however, so very thin at the centre, as to appear like a black spot. But as one of the surfaces is convex, it is separated from the other at the edge; and therefore at the edge, and for a considerable distance inwards, the plate of air is so thick, as to shew no colour. Its thickness gradually diminishes as we approach the centre, until, at a certain point, colours begin and continue through various gradations of thinness, till we arrive at the excessively thin black spot.

The subjoined figure shews the arrangement adopted for observing the coloured rings, in which apparatus, two large object glasses are pressed

Fig. 4.



together at their edges by three screws, by increasing the pressure of which, the size of the black spot is increased.

ON ALBINOS, OR WHITE NEGROES.

AMONG the varieties of human beings, judging those varieties by external appearances, few are more remarkable than the *Albinos*, or *White Negroes*. Albino is a word of Portuguese origin, signifying *white negro*, and was first applied to some natives of Central Africa, who were perfectly white, although the general form of their bodies was decidedly of a negro cast. Similar individuals, that is, similar so far as regards the pearly whiteness of the skin, have since been observed in various countries; but the same term, Albino, has been, and still is, applied to all of them. Before we speak of the causes of their peculiarities, we will cite a few instances of their existence, as given by different authors.

Wafer, an old voyager, met with some Albinos in the Isthmus of Darien. He observes:—

Their skin is milk-white, much like the colour of a white horse, and covered with a short down. They see not very well in the sun, poring in the clearest day; their eyes being but weak, and running with water if the sun shine towards them; so that in the day-time they care not to go abroad, unless it be a cloudy dark day. But notwithstanding their being thus sluggish and dull in the day-time, yet when moonshiny nights come, they are all life and activity, running abroad and into the woods, skipping about like wild bucks, and running as fast by moonlight, even in the gloom and shade of the woods, as the other Indians by day, being as nimble as they, though not so strong and lusty: hence they are called *moon-eyed*.

Mr. Jefferson, in his *Notes on Virginia*, states that he had seen seven examples of this peculiarity in the negro race. Three of them were sisters, having two other sisters who were black. They were uncommonly shrewd and quick in apprehension and reply. Their eyes were in a perpetual tremulous vibration, very weak and much affected by the sun; but they could see better than other persons in the night. The fourth instance was a woman whose parents came from Guinea, and had three other children of their own colour. She was freckled, and had such weak eyes that she was obliged to wear a shade in the summer; but she saw better in the night. The last instance was a man, who was tall in stature, and had tremulous weak eyes.

Dr. Winterbottom saw a white African woman, with a remarkably coarse and wrinkled skin: it was dry and harsh to the touch, and marked with deep furrows. It had a reddish tinge in parts exposed to the sun, being of a dirty white in other situations. Black spots, like freckles, the size of a pea, were thickly scattered over the skin. Another tall and well-formed white negro had a similar rough, harsh, and freckled skin. Another young white negress had the skin of an unpleasant dead-looking white, and pretty smooth, but beginning to assume a cracked appearance, from the action of the sun.

Captain Cook describes five or six Albinos, which he saw at Otaheite. The skin was of a dead white, like the nose of a white horse, scurfy, and covered with a white down. They had white hair, beard, eyebrows, and eyelashes.

Another example mentioned by Dr. Winterbottom, was the daughter of two mulattoes, born in Nova Scotia, who had all the negro features, with woolly hair of a dirty white colour, and a skin equalling in whiteness that of a European without anything disagreeable in its appearance or texture. Her eyes were between a red and a light hazel colour, and not much affected by light.

Albinos are not confined to tropical nations. They have been met with among the natives of Germany, *Denmark, England*, Ireland, France, Switzerland *Italy, the Grecian* Archipelago, and Hungary

These, then, being a few of the observations which various travellers have made respecting the existence of Albinos, we will proceed to state the views of anatomists and physiologists respecting the cause of this singular phenomenon.

The general characteristics of the Albinos are—white skin, white hair, and reddish or pink eyes. The skin is generally of a pearly whiteness, without any admixture whatever of a pink or brown tint. In the snow-white skin of the fairest European female there is always a slight pinkish or brownish tint; but in the Albino the skin is generally wholly destitute of either, and is of a dull pearly whiteness. It has, however, not the soft and smooth texture of the skin of a European, but is very frequently harsh, rough, and dry.

The hair, not only of the head, but also of the eyebrows, eyelashes, and beard, is white; but, as it has been observed, "this whiteness of the hair is not like the soft snowy whiteness of the hoary hair of old age, and still less like the delicate yellow or flaxen tint of the fair-haired European woman, but is rather like that of the white horse."

With regard to the colour of the eye, we must remind the reader that when we speak of a person having "hazel" or "blue" eyes, we allude to the colour of the *iris*, or that circular portion which surrounds the central hole, or pupil, of the eye. Now in the Albino this iris is generally of a pale rose colour, while the pupil itself has a disagreeable red tinge.

Singular as it may appear that red eyes should accompany white skin and hair, physiologists are of opinion that one cause produces the whole; and to explain that cause, it will be necessary to consider the structure of the skin.

The skin of the human body consists of three separate parts,—the *cuticle*, or outer skin, the *cutis*, or inner skin, and a peculiar substance interposed between them. Now it is supposed that the cuticle has very little organic power in it: it is supposed to be almost wholly destitute of blood-vessels or nerves, and is in fact to act the part of a sheath to the delicate structures beneath it. The *cutis*, or inner skin, is, on the contrary, exquisitely sensible, and so profusely supplied with blood-vessels, that the smallest cut or prick will draw blood; and we must always remember that it is the cutting of the *inner*, and not of the *outer* skin, which occasions the flow of blood.

Now both the inner and outer skin are perfectly colourless; but there is generally a substance interposed between them, which is coloured, and which imparts the particular tint to the body. In Negroes, Caffres, and Malays, this middle skin presents the form of a black or exceedingly dark membrane, about as thick as the cuticle, and is composed of a delicate cellular tissue, containing a dark substance, on which its colour depends. It is this dark substance which gives the black colour to the negro, since the actual skin itself is quite white and transparent. In other human beings this interposed substance is brown, red, yellow, or white, and thus affords all those varieties of tint which we observe in the inhabitants of different countries. This, then, being the case, we shall be prepared to believe that if the central skin, or cellular membrane, in an Albino, contain a substance perfectly white, or if the middle skin be absent altogether, either supposition will account for the pearly whiteness which they present. Such is the opinion arrived at: some anatomists doubt whether the central skin exists at all in a white person, but all are agreed, that if it exist, it is perfectly free from colour.

Precisely the same line of reasoning will apply in the case of the hair. It is believed that the colour of

the hair, in human beings generally, is due to a coloured substance, contained in an inner cellular membrane, and that the whiteness of an Albino's hair results from the absence of that substance.

With respect to the eye, the same mode of reasoning, slightly modified, will apply. The interior of the hinder half of the eye is covered with a black substance, called *pigmentum nigrum*, or black paint, the object of which is supposed to be to absorb, or stifle in some way, the rays of light, after they have performed their office in the production of vision. The hinder surface of the iris is also coated in a similar manner, probably to prevent rays of light from gaining access to the interior of the eye by any other channel than the pupil. This black coating is observed in the eyes of nearly all human beings, but it is *absent in the Albino*, and the visible redness is due to blood-vessels. The important office which the eye has to perform requires the aid of an exceedingly numerous assemblage of blood-vessels, both in the hinder part of the interior of the eye, and in the iris. These vessels are, in ordinary cases, concealed by the black substance of which we have spoken; but in the Albino, the black being absent, the light soon irritates these vessels, and they become filled with red blood, which gives to the part where they are situated the appearance of a red, more or less intense.

A great deal of discussion has occurred among medical men, as to whether the peculiarities of the Albino are the result of disease, or whether they are to be ranked merely as similar instances to the varieties of colour among cattle, horses, &c., which, whatever may be their cause, do not appear to be the result of disease. We cannot pursue this subject farther, but it appears to be the general opinion that Albinos are not subject to any particular disease; but that the inability which they manifest to bear strong light, and one or two other circumstances peculiar to them, are natural results of the absence of that colouring matter to which we have alluded, but do not indicate anything that may be called disease.

It has been remarked that a great many other animals besides man present occasionally specimens similar to the Albino, in regard to white skin and hair, and red eyes. Among the animals enumerated are—sheep, pig, horse, cow, dog, cat, rabbit, mouse, ferret, monkey, squirrel, rat, hamster, guinea-pig, mole, opossum, martin, weasel, roe, fox, rhinoceros, elephant, badger, beaver, bear, camel, buffalo, ass, crow, blackbird, canary-bird, partridge, common fowl and peacock.

THE true art of being agreeable, is to appear well pleased with all the company, and rather to seem well entertained with them than to bring entertainment to them. A man thus disposed, perhaps, may have not much learning, nor any wit; but if he has common sense, and something friendly in his behaviour, it conciliates men's minds more than the brightest parts without this disposition; and when a man of such a turn comes to old age, he is sure to be treated with respect. It is true, indeed, that we should not dissemble and flatter in company; but a man may be very agreeable, strictly consistent with truth and sincerity, by a prudent silence where he cannot concur, and a pleasing assent where he can. Now and then you meet with a person so exactly formed to please, that he will gain upon every one that hears or beholds him; this disposition is not merely the gift of nature, but frequently the effect of much knowledge of the world, and a command over the passions.—*The Spectator.*

HABIT hath so vast a prevalence over the human mind that there is scarce anything too strange or too strong to be asserted of it. The story of the miser, who from long accustoming to cheat others, came at last to cheat himself, and with great delight and triumph picked his own pocket of a guinea to convey to his hoard, is not impossible or improbable.—FIELDING.

THE DOLPHIN.

MOST persons are familiar with the form of this fish, as represented in heraldry, and on fishmongers' signs, than which, however, nothing can be more ridiculously incorrect. The true form is here represented from a drawing taken from nature; but the superlative beauties, and magical transitions of colours, which the fish exhibits when dying, and for which it is so remarkable, no pen or pencil could adequately describe. Indeed the sudden and frequent alternations and elaborate combinations of effect, so completely defeat the efforts of the pencil, that the pen has the advantage in the attempt; and the following description from FALCONER'S *Shipwreck*, is perhaps the most faithful record we have seen in writing:—

> But while his heart the fatal javelin thrills,
> And flitting life escapes in sanguine rills,
> What radiant changes strike th' astonished sight!
> What glowing hues of mingled shade and light!
> Not equal beauties gild the lucid west
> With parting beams all o'er profusely dressed,
> Not lovelier colours paint the vernal dawn,
> When orient dews impearl th' enamelled lawn,
> Than from his sides the bright suffusion flow,
> That now with gold empyreal seem to glow;
> Now in pellucid sapphires meet the view,
> And emulate the soft celestial blue;
> Now beam a flaming crimson on the eye,
> And now assume the purple's deeper dye;
> But here description clouds each shining ray,
> What terms of art can Nature's powers display?

To persons who have never witnessed the painfully interesting sight of the *dying dolphin*, the above description may be thought to partake too much of the fabulous stories which have been related of this fish. Even an intelligent writer, of recent date, and one who had crossed the Atlantic, speaking of the *manchineel* tree, whose delcterious properties have been somewhat exaggerated, observes, that "the common stories about the fatal shade of this tree, are as *fabulous* as the changing colours of the dying dolphin." There are many persons, however, who have been eye-witnesses of the fact; and the writer of this paper now refers to an instance which came under his own observation.

The fish, which was a large one, and was taken with a line, evinced extraordinary power, while in the water, but on reaching the deck, it became passive, indicating a stiffness that seemed to deny it the power of much action, beyond raising its tail occasionally, and flapping it on the deck with great force. This inertness was probably occasioned by exhaustion from the length of time (about twenty minutes) it had been struggling at the end of the line, before it could be brought to the ship's side. Some idea may be formed of the velocity with which this fish travels through the water, when we state that the vessel was going at the rate of eight miles in the hour, and that the first intimation given of a fish being hooked to the line, which was of considerable length, and had been towing *astern*, was from its being carried, with a prodigious strain on it, abeam, or *abreast* of the ship, and during the time the fish was "in play," it was frequently *before* the beam.

The fin that runs from the top or back part of the head to the tail, is of a dark *blue-black*; a dark blue pervades the upper part of the back, but it is susceptible of a partial change to a green, particularly in a glare of light. As it approaches the sides, it gradually takes a lighter shade, till it softens into a rich cerulean blue, commingled with delicate hues of golden pink; these again, by similar gradations, fall into a bright yellow or amber, at the belly; the *post-branchia* and under-fins, being of the same colour, but much darker; and the whole surface of the sides is beauti-

fully bespangled with vivid light blue spots. These several colours frequently relaxed into subdued tones, and again returned to their former complexion and brightness, presenting in the progress, the most fantastic involution of hues, till, at length, the whole body assumed a cold silvery blue and purple cast, varying in its shades, but deepest about the back, where a rich bloom continued to play on the surface.

As the period of dissolution approached, and during its last paroxysms, the same transitions occurred in quicker succession, though infinitely less vivid on each occasion, till in expiring the body became violently convulsed; and as the trembling gradually subsided, a dull silvery slate colour *crept*, as it were, over the whole surface; and, settling in the stiffness of death, presented an aspect so intensely cold and ghastly that it produced a shivering thrill in the spectators.

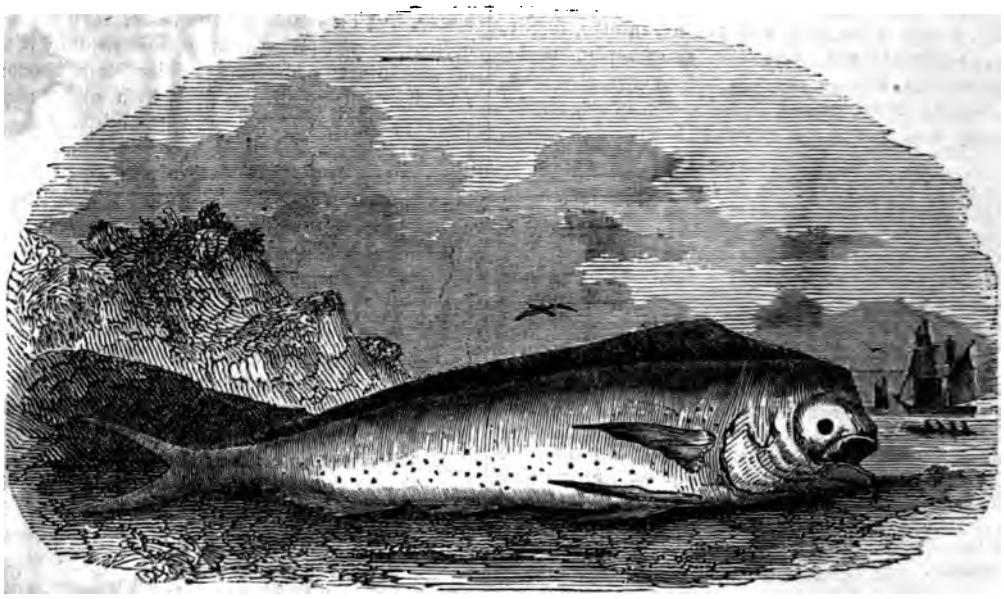
It is to be observed that this fish is most frequently taken with the harpoon, when death is materially accelerated; and most commonly when it is caught with a line, the sailors kill it, before, or immediately after, it is brought on deck; whence it is obvious that these singular manifestations are only partially portrayed.

This fish seldom exceeds four feet in length, and is commonly not more than two or three feet. It is without scales, and has a firm and smooth skin. Its flesh is rather coarse and dry, but the sailors regard it as a *bonne bouche*, after a too familiar acquaintance with salt provisions.

It is proper to state one circumstance which has no doubt encouraged a disbelief in the natural peculiarities of this fish; namely the existence of another fish which among modern naturalists bears the name of the Dolphin, (*Delphinus*), and which belongs to the *cetaceous* tribe, having a close resemblance to the *porpoise*. The fish we are more particularly noticing is the *Cocyphæna hippuris*, of the order of *Thoracici*, of Linnæus, the *Dorado* of the Portuguese, and is unquestionably the Dolphin of the ancients, if we may judge, not only from the ordinary representations of it, but from those representations being in accordance with the figure on the coin of Alexander the Great, preserved by Belon, and which gives it the declined and truncated head, and the back fin running the whole length from the head to the tail; whereas the Delphinus has no such fin, and its head tapers towards the mouth, terminating with what may be termed a *snout*. We have further evidence in the term "the *arrow* of the sea," from its remarkable swiftness, especially when in pursuit of its prey,

THE FLYING FISH.

As these diminutive inhabitants of the ocean rise from the watery element, their silvery brightness, and the delicacy of their forms, beautifully contrasting with the dark blue waters beneath them, and rendered more vivid and sparkling when the sun's rays or the pale moon-beams catch their glistening wings, they produce an effect of singular beauty, and one which seems to partake of the influence of enchantment. But to the reflective mind there is something painfully interesting in going from the *effect* to the *cause*, and there to find the truth exemplified, that there is much that is beautiful to the sight, that is allied to misery and suffering. To escape from their pursuers they leave their native element to avoid destruction; but the penetrating vision of the dolphin, when aided by the unobscured light of a tropical sun upon the waters, marks their shadows on the surface, and he follows their course till their wings become dry and relaxed, when they drop with the noise of a hail-stone shower, and become an easy prey: those that escape again rise with replenished powers, again and again, as necessity dictates; thus passing a transitory and precarious existence, alternately inhabitants of the air and of the water. Nor is this the scope of their vicissitudes; for in their attempt to elude their enemies of the deep they frequently become a prey to the aquatic birds, which seize them on the wing.



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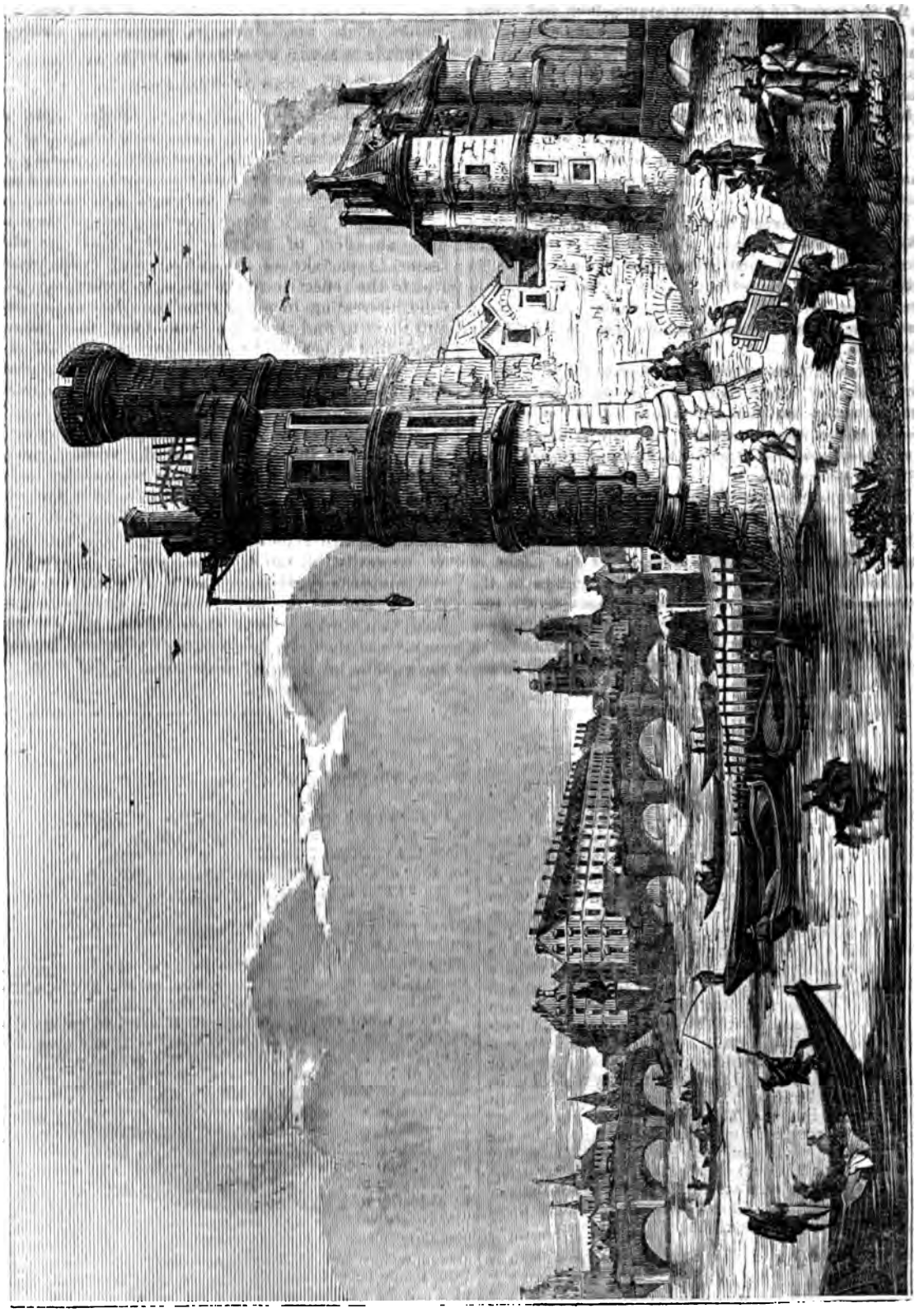


TOUR DE NESLE.—OLD PARIS.

SOME ACCOUNT OF PARIS, HISTORICAL AND DESCRIPTIVE.

PART THE SECOND.

PARIS UNDER THE FRANKS.

ALTHOUGH at various times in the third and fourth centuries of the Christian era, Gaul suffered from the ravages of different barbarian nations, still the power of Rome was sufficient throughout those periods to prevent the invaders from effecting any permanent settlement in that country. But in the beginning of the fifth century, (or in the month of December, 406,) the barrier of the Rhine was crossed by a host of Vandals, Burgundians, and others, who never repassed it; and for several years, Gaul was afflicted with all the evils which naturally attend the presence of hostile barbarians in a country comparatively civilized. Two of these nations, the Burgundians and the Visigoths, founded kingdoms, the first in the eastern, and the second in the southern part of Gaul; they professed a nominal subjection to the Emperor of the West, and, in common with the Saxons, Franks, and others, assisted the Roman general, Ætius, to repel Attila, the king of the Huns, in 451.

Among the earliest invaders were the Franks, a confederacy of German nations, each of which was independent, and had its own king. Several of these nations or tribes, were settled in the north-eastern part of Gaul, about the middle of the fifth century; and one of them, the Salians, whose capital was Tournay, are said to have extended their predatory incursions as far as Paris. Several exploits in the neighbourhood of that city, and even a siege of it for the long space of ten years, are attributed to Childeric, one of the Salian monarchs; but the only authority for the statement is the legend of Sainte Geneviève. Childeric, however, died in 481, and was succeeded by his son *Chlodovech**, or Clovis, who extended his dominion over the greater part of Gaul, and is generally considered as the founder of the French monarchy. In the year 508, Clovis fixed his residence at Paris, which became the capital of his territories; he died there in 511, and was buried in the church of St. Peter and St. Paul, (since known as that of Sainte Geneviève,) which he had founded in conjunction with his wife Clotilda.

When at the death of Clovis his territories were divided by his four sons, Paris was regarded as a common property, no one of them being able to enter it without the consent of his brothers. Chlodomir, one of the four, died in 524; his three sons were disposed of, and their inheritance divided among their three uncles, one of whom, Charibert, having Paris in his share, took the title of *King of Paris*. His son Clotaire succeeded him in his title; but becoming shortly afterwards the sole monarch of the three divisions of Gaul, he laid aside that title for a more comprehensive one. At his death, in 561, a fresh division revived the kingdom of Paris, which was held by his son Charibert, until 567, when Chilperic, another son of Clotaire, united it to the kingdom of Soissons, fixing his ordinary residence, however, in the city of Paris. Chilperic being assassinated in 584, as he was returning from the chase to his palace in the vicinity of the capital, was succeeded by his son Clotaire II., who, in 613, became sole monarch of Gaul, his place of residence being Paris, where he died in 628, leaving two sons, Charibert II. and Dagobert. In 631, Dagobert became sole monarch, and his ordinary residence was likewise at Paris, or in its vicinity. He founded the famous abbey of St. Denis, near that city, and endowed it liberally with possessions in every province of France. The remaining kings of the first or Merovingian race, are known in French history by the title of *Rois Fainéans*, or Sluggard Kings, their sovereignty being only nominal, and all substantial power being exercised by the great officers, styled the *Maires du Palais*, or Mayors of the Palace. Chilperic III., the last of these kings, was deposed, shaven, and shut up in a monastery, in the year 752, when the mayor, Pepin le Bref, assumed the sovereignty, and founded the second, or Carlovingian dynasty of French kings.

* The harsh guttural names of the Franks were softened down by the early French historians. *Chlodovech* became Clovis, *Chlothacaire* Clotaire, *Chrotechilde* Clotilde, *Gunthramm* Gontram. From *Clovis* was formed *Louis*, just as from its old Latin and German equivalents, *Chlodovæus* and *Chlodwig*, were formed *Ludovicus* and *Ludwig*.

ESTABLISHMENT OF CHRISTIANITY AT PARIS.

IT is a matter of some doubt, at what period, and by whom, the Christian religion was first regularly established at Paris. The historian Gregory of Tours†, after briefly relating the persecution which the Christians suffered under the Roman Emperor Decius, has the following passage:—"At this same time, seven men, ordained bishops, were sent into Gaul, to preach there, as is related in the History of the passion of the holy martyr Saturninus. It is there said: 'Under the consuls Decius and Gratus, according to a faithful tradition, the city of Toulouse began to have for a first bishop, St. Saturninus.' The bishops who were sent into Gaul, were Gratian to Tours, Trophimus to Arles, Paul to Narbonne, Saturninus to Toulouse, Dionysius to Paris, Stremonius to Clermont, and Martial to Limoges. One of them, the blessed Dionysius, bishop of the Parisians, full of zeal for the name of Christ, suffered divers punishments, and a cruel sword removed him from this life."

This statement would make it appear, that St. Dionysius, or Denis, as the French call him, was sent to Paris with the title of bishop, in the year 250. But, unfortunately, the *Acts of St. Saturninus*, which Gregory professes to quote, and which have come down to us, make no mention of St. Denis, or indeed of any one of the seven bishops (Saturninus excepted) who are said to have been included in the same mission. This circumstance, added to the well-known credulity of Gregory of Tours, has given rise to doubts concerning the reality of the mission, and the period assigned to it. At all events, it is inferred, from a document preserved by that writer, that if it actually did take place, it could not have been attended with much success, because even more than a century afterwards, paganism prevailed in Gaul, especially in the rural districts. From a letter written in the year 589, by seven bishops of that country, we learn, that in the latter part of the fourth century, St. Martin scattered the seeds of the Christian faith, and that, "till then, the unspeakable mysteries of the divine Trinity had only come to the knowledge of a small number of persons." This would transfer from St. Denis to St. Martin, the glory of having converted the Gauls to Christianity.

In the eighth century, appeared the *Acts of St. Denis*, which greatly increase the difficulties of the matter. They place the mission of St. Denis, and the other bishops, in the time of Clement, who was pope or bishop of Rome, between 91 and 100; thus assigning to it a date 150 years earlier than that given by Gregory of Tours. But the different copies of these *Acts* (to say nothing of their slender authority,) contradict one another in the most material facts, some indicating Paris and the banks of the Seine as the scene of the labours and martyrdom of St. Denis, while others transfer it to the borders of the Rhine.

In the ninth century, a vigorous attempt to rescue the patron of the Parisians from the uncertainty and obscurity of opposing legends and traditions, was made by Hilduin, abbot of St. Denis, who was charged by King Louis I. with the task of writing the saint's life. Utterly rejecting all previous accounts, the abbot discarded the saint whom they celebrated, and substituted another of the same name, but less doubtful existence,—namely, St. Denis the Areopagite, who was converted by St. Paul, and appointed first bishop of Athens. It is true that the *Acts* of this saint testify to his having received martyrdom in that city, and to his body having there become a prey to the flames. But the undaunted Hilduin maintains that the persecuted Areopagite revived at Athens, and repaired to Rome; that from Rome he was sent by Pope Clement into Gaul; that at Paris he was beheaded with his companions, Rusticus

† The father of the French historians. He was born in 544, made bishop of Tours in 573, and died in 595.

and Eleutherus, and that after his decapitation, he rose up, took his head between his hands, and carried it, under the guidance of angels, from the scene of his martyrdom to the place of his burial*.

This new legend was supported with all the ingenuity of which Hilduin was master; but it met with several opponents. The abbot abused them and treated them as "triflers, arrogant, half-learned, blind, imbecile, impious, obstinate, companions of the father of lying, murmurers, men of the worst kind, blockheads;" and at last went so far as to tell them that they were "not men." His opinion at length prevailed, and maintained itself for eight hundred years, or until the seventeenth century, when it was attacked by a number of writers, and in its turn treated as fabulous.

The first bishop of Paris, who is so styled in a public document, is Victorinus, the sixth in the common list, beginning with St. Denis; he is mentioned in the acts of a council, held at Cologne in 346. Paris itself was the seat of a council or synod so early as 360 or 361; the object of which was to support the orthodox faith against the Arian heresy. The ninth bishop was Marcellus, who has given his name of *St. Marcel*, or *St. Marceau*, to an extensive portion of modern Paris. This prelate died in 436, after having converted a great number of pagans to the Christian faith,—a fact which is supposed to be allegorically represented in the legend of his victory over a dragon which desolated Paris. "About this period," says Dulaure, "the dragon vanquished by a saint was an emblem of numerous conversions,—of the triumph of Christianity over the demon, the enemy of that religion, represented under the form of a serpent."

It would appear, however, from a law of Childebert, king of Paris, that as late as the year 554, idolatry subsisted in the surrounding country. "We order," says that monarch, "that all who have in their field or in any other place, images or idols dedicated to the demon, shall overturn them as soon as they are warned to that effect. We prohibit them from opposing their destruction by the bishops; and if after having engaged by surety to destroy them, they still preserve them, we will that they be brought into our presence. We prohibit also the disorders which are committed in the night-time, on the eve of festivals, even those of Easter and Christmas, occasions on which there is nothing but singing, drinking, intoxication, and other debaucheries. We likewise order the women, who on Sunday run about the country dancing, to cease this practice, which offends God."

COMMERCE OF PARIS, UNDER THE FRANKS.

The commerce which Paris enjoyed under the Roman dominion maintained itself during the rule of the Franks. Like all barbarians this people were passionately fond of rich dresses, trinkets, and arms decorated with the precious metals; the sale of such commodities was accordingly much encouraged by them. The native inhabitants of Paris, however, do not appear to have taken any considerable share in this trade,—the principal merchants of the city being Jews, Syrians, and inhabitants of the south of France and other countries. In spite of all the risks and disadvantages which attached to the pursuits of peaceful industry, in an age of such disorder, some of these merchants realized large fortunes, and attained to stations of high importance. A Jew named Salomon became receiver-general of the revenues of the exchequer, under King Dagobert; and a Syrian, named Eusebius, acquired sufficient wealth to buy a bishopric, and in 591 was made bishop of Paris.

Great perils and losses were incurred in the transport of goods; upon the sea they were exposed to the attacks of pirates, and upon the river Seine to those of various powerful hordes dwelling on its banks. The land carriage was attended with the worst dangers of all; the roads being infested by troops of brigands, headed by Frank chiefs, of the most distinguished families, who considered such a mode of life rather reputable than otherwise. Another source of oppression was the civil wars, which continually desolated Gaul under the first race of kings; it being the common practice for the armies to plunder wherever they could, without troubling themselves much to distinguish between friends and enemies. Even life itself was risked in the merchant's venture. The sons of Wadon, mayor of the palace under Chilperic, (whose daughter he robbed of her treasures, when sent to escort her to her husband,) used to seize merchants, under cover of the night, despoil them, and then put them to death.

But, besides these violent extortions, commerce was exposed to a variety of burdens, in the more orderly form of tolls, duties, and other legal exactions. A curious record of the fiscal ingenuity of this barbarous age has been preserved in a document of the year 629, relating to the abbey of St. Denis, which King Dagobert had just founded, and was then most liberally endowing. In this document that monarch establishes a fair close to Paris, on the north bank of the Seine (near the present Porte St. Martin), and assigns the revenues which should arise from it to the abbey in question. He accordingly prohibits the counts, their vicars or viscounts, and others, from levying, for three years, any contribution on the merchants of his kingdom, or on those from Rouen and the port of Vick, who shall visit Paris, to purchase there wine, honey, and madder; and declares that during that space of time he exempts them from all imposts. At the expiration of the specified period there is to be levied by the agents of the abbey of St. Denis, a duty of two sous for each measure of honey, and two sous for each measure of madder. The Saxon merchants, those of Rouen and those of Vick, are to pay twelve deniers for the same measures, besides paying the duties styled *navigios*, *vultaticos*, and *passionaticos;* on these conditions also, the merchants of Lombardy, Spain, and Provence, and other countries, are permitted to repair to this fair. Those of the Parisian territory are forbidden from carrying on their trade, on the day of this fair, anywhere else than in the market, founded in favour of the abbey of St. Denis; and all officers are ordered not to offer any impediment to the market, and not to levy upon the goods brought to it any of the customary duties.

The trade carried on at Paris consisted in articles of utility, such as wine, oil, honey, madder, &c., and to a great extent in objects of luxury, such as trinkets, ornaments, arms, belts and girdles, decorated with gold and precious stones, &c. The materials for clothing and furniture were produced at home; the king, as well as every powerful lord, had his manufactory, in which female slaves spun and wove flax and wool. This establishment was styled a *gynæceum*, a term signifying, in its classical sense, "women's apartment." The *gynæcea* existed in Gaul when the Franks possessed themselves of it; there were, likewise, numerous dyeing establishments, named *baphiæ*, but these disappeared under their rule. Besides the articles furnished by the gynæcea there were no manufactures of any importance; most of the objects of luxury, and even of necessity, were brought from foreign countries.

For the purposes of writing, the material known by the name of *papyrus* was commonly employed; it was generally imported by the merchant-vessels trading between Egypt and Marseilles. Gregory of Tours, in writing to defend his brother against the attacks of Felix, bishop of Nantes, thus addresses the calumniator: "If you possessed the bishopric of Marseilles you would not require from the vessels which unload in its port either oil or other merchandize; you would want only *papyrus*, so as to be able at your ease to employ it in defaming persons of respectability; it is unfortunate that the scarcity of papyrus should put a limit to your scribbling."

SIEGES OF PARIS BY THE NORMANS.

The most remarkable feature in the history of Paris under the second race of French kings is the series of attacks which it suffered from those formidable Northmen, or Normans, who, issuing from the cheerless regions of Scandinavia in their myriads of barks, repeatedly in the ninth and tenth centuries ravaged the fairest countries of Europe, and at last effected a permanent settlement in the territories of England and of France. The sole object of these fierce invaders was plunder; and during the general disorder of the times, they had but too many opportunities of gratifying their cupidity. As early as the year 808 they began to infest the coasts of Gaul; in 820 they ascended the Seine in boats, and endeavoured to penetrate into the interior of Neustria, but were repulsed. In 841 they repeated the incursion, encountered no obstacle in their progress up the river, pillaged all the inhabited places on both banks, and then retired, laden with booty.

Emboldened by success, thus easily obtained, they renewed their visit in 845, and ascending the Seine in 120 boats, presented themselves before Paris on the eve of

476—2

* This ridiculous incident seems to have been very popular with the framers of legends, as it figures in the lives of many other saints.

Easter-day. The city was defenceless, and no attempt was made at resistance. The monks and priests fled in haste with their relics and other treasures; the terrified inhabitants followed with equal precipitation, and all that they left behind became the prey of the Normans. Charles the Bald advanced with an army as far as St. Denis, or within six miles of the enemy, but fearing to attack them, he had recourse to negotiation, and purchased their retreat with 7000 pounds' weight of silver,—an inglorious expedient which was attended with the usual consequences. For at the close of the year 856, a fresh incursion took place; Paris was a second time pillaged, and the work of devastation continued throughout the month of January, 857. "The Danish pirates," says a contemporary chronicle, "who sojourn on the banks of the Seine, ravage all the neighbouring places; they enter into the Lutetia of the Parisians, burn the church of the blessed Peter and Sainte Geneviève, and all the other churches, except that of St. Stephen, called the Cathedral, that of St. Vincent, and St. Germain and that of St. Denis (de la Chatre), which purchased their exemption at the price of considerable sums."

In 861, about Easter, the Northmen appeared for the third time before Paris: and such was the miserable incapacity of the French government, that no intelligence of their approach preceded the invaders. They entered the monastery of St. Germain-des-Prés, in the southern suburb, and surprising the monks at their matins, forced them to seek safety in flight or concealment; they pillaged the sacred edifice of its holy vases and other precious objects, and after setting fire to it and killing some of the inmates who had not time to escape, they departed into the city. The merchants endeavoured to escape with their effects, but were overtaken and plundered; and the town was then reduced to ashes. Their next exploit was to break down the bridge which communicated between the city and the northern bank of the Seine, the "Great Bridge," answering to the Pont-au-Change of the present day. The piles of this structure preventing the passage of their large boats, had hitherto offered an insuperable obstacle to their further progress up the river; its destruction left them at liberty to proceed beyond Paris, and pillage countries which before were free from their visitation. Upon this occasion they ascended the Seine to the town of Melun; and then advanced up the Marne as far as the monastery of Saint Maur-des-Fossés, of which they gained possession.

The extent and boldness of this last incursion aroused the Frank king, Charles the Bald, from his long apathy; as soon as the Normans had retired he ordered the reconstruction of the Great Bridge; thus seeking again to establish the obstacle which had formerly barred their progress beyond Paris. "For the tranquillity of our whole kingdom, for the defence of the holy church of God, and to be preserved from the ravages of the Normans," says the monarch in his decree, "it has pleased us, with the consent of Eneas, bishop of Paris, our faithful, to cause to be built at Paris and on the territory of the monastery of St. Germain, formerly named Auxerrois, a great bridge, (or the Great Bridge,) at the expense of our treasury;" and he then proceeds to give, for the love of God, of Holy Mary the Mother of God, and of St. Stephen, the produce of this bridge to the Bishop of Paris and his successors. To protect the structure from the fate of its predecessor, towers, or little fortresses, were built at the two extremities, and the Petit Pont, or little bridge, over the smaller, or southern arm of the Seine, was similarly fortified.

Four-and-twenty years elapsed before the Normans again insulted Paris with their presence; but their next visit was of a less transient character than they had hitherto been accustomed to pay. The immediate occasion of it is said to have been an act of treachery perpetrated by the reigning king, Charles the Fat, which led to the death of one of the principal leaders of the Normans, and provoked the furious wrath of that people. In 885 the news reached Paris that they were coming up the Seine; but the city was now better prepared to resist them, than it had formerly been, and its means of defence were promptly strengthened, under the guidance of its active bishop, Goslin, who, like many of the prelates of those disordered times, was a bold and skilful warrior. His prudent measures inspired confidence, and Paris, with its walls and towers, guarded by bands of intrepid soldiers, came to be accounted an impregnable fortification. The churches and monasteries of the neighbouring country, and even of some more distant districts, hastened to deposit within its safeguard the most valuable of their treasures, the bodies of their saints, and all their precious relics; thus preferring the protection of a strong fortress, to the precarious efficacy of their own virtue.

Covering the river with their barks for the space of two leagues, the Normans appeared under the walls of Paris, to the number of 30,000 men. The improved defences of the city seem to have made an impression upon them: for they now contented themselves with demanding a free passage up the Seine, promising, if it were granted, to leave Paris untouched. This demand, which was equivalent to requesting the destruction of the bridge, was refused by Bishop Goslin, and Odo (or Eudes), count of Paris; upon which the Normans proceeded to lay siege to the city. On the 25th of November, the whole host, headed by their leader Sigefroy, rushed to the assault: their principal efforts were directed against a wooden tower, raised upon a foundation of masonry, at the western end of the island upon which the city stood, and forming probably a part of the palace of the court, which has given way to the Palais de Justice of modern times. This little citadel was closely besieged for thirteen months; and eight times during that period it was vigorously, but unsuccessfully, assaulted. In the intervals of their useless efforts the Normans employed themselves in pillaging and ravaging the surrounding country; but owing to the precautions which had been taken previous to their arrival, the booty which they gathered was far less than they had been accustomed to carry off. On the 6th of February, 886, the waters of the Seine carried away one half of the Petit Pont, and by this accident the tower which guarded the southern extremity of that bridge, stood completely isolated. The warriors who manned it, cut off from all assistance, defended their post with the energy of desperation; but, overpowered by numbers, they were finally slain, and the structure itself given to the flames. In the following summer the city was again exposed to great danger, by the fluctuations of the river, the heat of the season dried up its waters to such an extent that the stream became fordable. "Suddenly at the hour of dinner, when the besieged kept but slender watch, the Normans rushed to the river-side, in one or two bodies, plunged in, and, gaining the opposite bank, began to ascend by ladders the low walls with which, trusting to the usual depth of the water, its margin had been defended. A few gallant French champions rushed to arms, and made good the defence till more came up, and drove back the besiegers, chiefly by the aid, according to the clergy, of the relics of Sainte Geneviève, which were displayed upon the rampart."

At length, King Charles the Fat, urged by repeated solicitations, advanced towards Paris, at the head of an army, and encamped at the foot of the hill of Montmartre, in its vicinity. Finding, however, that the Normans were disposed to stand their ground, and fearing to risk the issue of a battle, he entered into a treaty with them, and on the 30th of November, 886, concluded a shameful peace, by which he promised to pay them 1400 marks of silver, in the following March, upon condition of their raising the siege. The wily pirates kept their engagement, and did raise the siege; but they by no means abandoned the enterprise, for the furtherance of which they had principally undertaken it, namely, the pillage of the countries beyond Paris. To accomplish this, without violating the treaty, they had recourse to the ingenious expedient of drawing their boats over the land for a short distance, and then launching them again into the Seine, above the city; after which they proceeded at their leisure to ravage the territories watered by the upper part of the Seine, and its affluents, the Marne and the Yonne. In May, 887, they returned to Paris to receive the price of their stipulated forbearance; and some time afterwards, heavily laden with spoil, they took their final departure, using the same expedient as before to evade the obstacle which Paris presented to the passage of their boats. Thenceforward Paris was never again troubled with their presence.

But about a century afterwards, or towards the close of the rule of the Second Race, the city was disturbed by an enemy, less barbarous, perhaps, than the Normans, but equally mischievous to the unfortunate inhabitants of the country which they visited. This was the Emperor Otho II., who, having a dispute with the French king, Lothaire, marched against Paris, at the head of 60,000 men, burnt the suburb on the northern bank of the Seine, fought a battle hard by, in which he lost many soldiers, among whom was his nephew, and then ascending the hill of Mont-

martre in triumph, caused his troops to sing *Hallelujah*, in celebration of the glory which he had gained, by advancing so near to one of the city-gates, as to strike it with his lance. After this premature rejoicing at an useless exploit, he was again attacked by Lothaire, and entirely defeated, being compelled to abandon his baggage in the flight.

FOUNDATION OF CHURCHES.

The last siege of Paris by the Normans was indirectly the cause of the foundation and increase of several religious establishments. For when the heads of the churches and monasteries whose relics had been placed for safety within the walls of Paris, required the restitution of those precious deposits upon the departure of the invaders and the consequent removal of the danger, the count and the bishop proved themselves to be but faithless guardians, by positively refusing to surrender in some cases more than a certain portion, and in others even any portion at all. The Cathedral of Paris—the Nôtre Dame of modern times—obtained a large share of the acquisitions thus unjustly made. The bishop consented, indeed, to give up the shrine of Sainte Geneviève to the abbey of that name; but he persisted in retaining the shrine of St. Marcel, belonging to the suburb of that name, the bodies of St. Saturninus and other saints, and some of the relics of St. Cloud.

The abbot of St. Germain-des-Prés had, on the approach of the Normans, deposited the shrine of St. Germain in the Cathedral, or in an ancient baptistery dedicated to St. John the Baptist, dependant on the Cathedral. When the danger was over, the abbot demanded back the body of his patron; but he could obtain it only on the condition of allowing an arm to be taken off and preserved in the chapel which had served as its asylum. The chapel, thus enriched, assumed the title of St. Germain-le-Vieux: it existed in an altered and renovated form until 1802, when it was replaced by private houses. Several other churches in the Island of the City, which have since disappeared, owed their existence and rank to this fraudulent retention of relics belonging to others; and the heads of them, like the monks of Nôtre Dame, scrupled not, when such exhibitions were customary, to display them as treasures conferring distinction on their respective establishments.

PARIS IN THE REIGN OF JOHN II.

(1350—1364.)

John II., surnamed the Good, (for what reason the French historians say they cannot tell,) ascended the throne on the 22nd of August, 1350, and on the 19th of September, 1356, he was taken prisoner by the English at the celebrated battle of Poitiers. During his captivity Paris was the scene of some extraordinary events, which were attended with calamitous consequences, and which are worthy of attention, as illustrating the importance and power then attained by the city under the government of its municipal body.

After the battle, John's eldest son, the Dauphin Charles, more commonly known as Duke of Normandy, fled to Paris, which he found in great consternation, and immediately assumed the title of Lieutenant of the Kingdom, being then scarcely twenty years of age. The condition of France at that time was such, that, had the king himself been at liberty, he would have found it difficult to carry on the government with success. The weakness and inexperience of his son, who resigned himself to the guidance of unprincipled ministers, greatly aggravated the evils of this state of things. The States-General had been already convened by the royal authority: the period named for their meeting was now anticipated, and they assembled at Paris on the 17th of October. The acts of this body were very offensive to the dauphin and his ministers; they required him to dismiss those ministers, and place them upon their trial,—to accept for his guidance in the future management of affairs, a "council of thirty-six," composed of twelve bishops, twelve knights, and twelve citizens, selected from among their own number; and to set at liberty the King of Navarre, known in history as Charles the Bad, who had been thrown into prison by John in the preceding year. The deputies, according to Froissart, were anxious to know and ordain how the kingdom of France should be governed, to the end that the king their lord might be delivered; and they wished also to know moreover what had become of the great treasure which had been levied in the kingdom in past times, in tenths, or oppressive taxes, in subsidies, and in the coining of money, and in all the other extortions with which their constituents had been troubled and distressed; while at the same time the public functionaries were badly paid, and the kingdom badly guarded and defended; but of this no one knew how to render any account. The dauphin had recourse to various manœuvres to avoid the public sitting in which the States would offer their demands; and at last he prevailed upon the members to return to their homes, and consult those whom they represented, while he consulted the king his father upon their propositions. The assembly accordingly separated on the 3rd of November, after having heard an ample recital of their grievances from Robert le Cocq, bishop of Laon, one of the most active and courageous among the new champions of the rights of the nation.

In adopting this course of proceeding, the dauphin calculated upon a resource which had frequently enabled the kings of France to baffle the opposition of the States-General. It was his intention to apply to the States of the different provinces into which the kingdom was divided, and he expected, with good reason, to find those smaller bodies more complaisant than the combined councils of the nation. "From provincial assemblies composed of the three orders," says Mr. Hallam, "the kings usually obtained more money than they could have extracted from the common representatives of the nation, and heard less of remonstrance and demand." Upon the present occasion the dauphin procured from them some supplies during the winter; but he was obliged at the same time to listen to energetic representations upon the necessity of great reforms in the administration of affairs. Soon afterwards he quitted Paris, and set out on a very expensive journey to Metz, to meet his uncle, the Emperor Charles IV; leaving behind him an ordinance for giving currency to a new and debased coinage*. Now the practice of tampering with the money of the realm was one of the very grievances of which the people then complained; and this fresh instance of it excited their indignation to a high degree. One of the loudest asserters of popular rights at this time was Etienne (or Stephen) Marcel, who enjoyed great influence in the city from holding the office of *Prévot des Marchands*, or "Provost of the Merchants," and being likewise a member of the "Council of Thirty-six." This important personage, who figures so conspicuously in subsequent scenes, repaired, at the head of a large concourse, to the palace of the Louvre, and there so resolutely addressed the young Duke of Anjou, who presided over affairs in the absence of his brother Charles, that the prince thought proper to suspend the obnoxious ordinance until the dauphin's return. The dauphin, however, when he came back, persisted in upholding it; and in the hope of getting it enforced, endeavoured to gain over Marcel to his side in a personal interview. But the provost of the merchants stood firm, and accompanied his refusal to share the iniquity of the proposed measure with exciting speeches, which becoming speedily known to the people, raised their discontent to a threatening pitch. The dauphin, alarmed, then thought fit to revoke the ordinance.

Elated at this victory, Marcel proceeded with an imposing force to the parliament, to demand the recall of the States-General, and the expulsion or arrest of several ministers and magistrates. The dauphin, who had also repaired thither, acceded to these demands: and the provost at once seized the effects of the accused functionaries, whom a timely warning had enabled to escape by flight. A political association, or brotherhood, was formed at Notre Dame, for the maintenance of the new order of things; and "there, for the first time since the origin of the monarchy, they dared to question the unlimited power of kings." The grievances of the people certainly justified a large amount of discontent; and the popular feeling in Paris was just now embittered by the miseries of the surrounding peasantry. The unhappy beings forming that class in France

* This was a favourite manœuvre with the earlier kings of the third race, whenever they were pressed for money, which was pretty often. "The long wars," says M. Secousse, "which Philip of Valois and his successors, till Charles VII., had to sustain against the English, caused frightful disorders in the coinage, which under the reign of those princes was in continual fluctuation. They used to debase it by degrees to a certain point, and then raise it suddenly to its intrinsic value, in order to be enabled to debase it again. Thus the price of the mark of gold and silver changed almost every week, and sometimes even more often." The people suffered severely from this unprincipled conduct of their sovereigns, who were openly styled *false coiners*. Yet if any of their subjects presumed to imitate the royal example, they were punished with atrocious cruelty, as in an instance recorded in the criminal registers of the parliament, from which we learn that on the 6th of March, 1347, two men, convicted of coining, were *boiled in a caldron* in the Place aux Pourceaux, and then hanged.

had long been treated with great cruelty and insolence, both their persons and their property being alike subjected to the will of their feudal lords; but the ills of their condition were heightened by the consequences of the battle of Poitiers. When the lords and knights who had been taken prisoners in that memorable conflict were released on parole, they repaired to their respective estates, to raise among their vassals the money which they had stipulated to pay for their ransom; and as there was scarcely a noble family in France which did not count one member among the captives, there was scarcely a lordship in the kingdom which escaped this exaction. If their tenants were not forward in paying, their masters were not backward in resorting to measures of compulsion. "*Jacques Bonhomme**," said they, "does not give up his money unless he is well beaten; but he shall pay, for he shall be beaten." Another source of calamity was the swarm of disbanded soldiers from both armies, who plundered the country with impunity. "The inhabitants of towns and strong castles," says Sismondi, "strove well to defend themselves, but the open villages, and those whose fortifications were insufficient, found themselves exposed to daily attacks from enemies whom they had never provoked. When the villagers were made prisoners, they were exposed to long tortures to wrest money from them; and when nothing more could be obtained from them, they were most frequently massacred. Very soon the Parisians saw enter within their walls, the peasants from the greater part of the Isle of France, with their wives and their children, and whatever they had been able to save of their effects, abandoning the uncultivated land to the brigands who ravaged it. Terror brought the monks and the nuns, although the monasteries all had some fortifications; and soon were seen to arrive at Paris, the sisters of Poissy, of Long-Champ, the monks of Melun, of St. Antoine, the friars-minors of St. Marcel, and finally all the inhabitants of the convents situated without the walls."

On the 5th of February, 1357, the States-General re-assembled at Paris; and on the 3rd of March, a public sitting was held, at which the dauphin presided, accompanied by his brothers, the Counts of Anjou and Poitiers. The Bishop of Laon addressed him in the name of the whole body, reciting their grievances and the proposed remedies, and offering him, if he acquiesced in their demands, an immediate levy of 30,000 men. The dauphin acceded to their proposals, and in the same month an ordinance was issued, embodying the required reforms. "Such," says Dulaure, "was the situation of Paris in 1357. Up to that time the States-General, the council of thirty-six, the provost of the merchants, kept within the limits of their duty; they demanded reforms which circumstances rendered urgent, and the dismissal of perfidious functionaries; they opposed the circulation of false money by the government; their conduct was lawful and worthy of praise; their resistance to tyranny is an act of virtue, the more admirable, because the history of the monarchy had not then offered a single example of it; but I cannot speak so favourably of the events which followed. In the career of political reforms we begin with pure intentions: afterwards, advancing in it, we encounter obstacles which often compel to actions which are not so. Such was the fate of these reforming novices."

The thirty-six deputies, who represented the states during the intervals of their sittings, wished to assume the whole power of the government; but the dauphin still preferred giving his confidence to the ministers whom he had promised to dismiss, and even prevented the levying of the taxes decreed by the states. The people, thinking that they had shaken off the yoke of despotic government, began to cool in their ardour; and the dauphin availing himself of this circumstance, sent for the provost of the merchants, and two other citizens of importance, and informed them that "for the future he wished to govern by himself, and no longer to have guardians; and he forbade them to meddle any more in the government of the kingdom." He even published an ordinance, re-establishing several abuses; and afterwards left Paris, on a journey into Pontoise. But the boldness of the armed companies compelled him to return; and at the request of the citizens he again convoked the states.

They accordingly assembled on the 7th of November. On the following day occurred an incident which had great influence on the course of events; this was the escape, or rather rescue, of Charles the Bad, from the castle of Arleux, in which he had been confined for the last six months. On his liberation, the King of Navarre directed his steps towards Paris; he was met at St. Denis by the bishop and provost, who conducted him to the abbey of St. Germain-des-Prés, where a lodging had been provided for him. Behind the walls of this abbey, on the side of the Pré-aux-Clercs, was a *champ-clos*, or enclosed field, which served as lists for the judicial combats, so common in the barbarous ages; and in this field was an elevated platform of wood, on which the judges were accustomed to sit. On the 1st of December, the King of Navarre ascended this platform, in the presence of nearly ten thousand men, and addressed to them an eloquent harangue. He spoke of his own innocence and the injustice of his enemies, and dwelt so pathetically on the horrors of his prison as to draw tears from many of his hearers; then having sufficiently excited them with his private wrongs, he drew a powerful picture of the public ills; pointing out at the same time those whom he regarded as their authors. The provost of the merchants, again assured of the popular support, repaired to the palace, and forced the helpless dauphin to become reconciled to the King of Navarre, and promise the restitution of his confiscated effects. Satisfied with this success, Charles the Bad, on the 13th of December, quitted Paris for Normandy.

The dauphin, whose sincerity was generally doubted, had the imprudence just now to make a levy of troops, under the pretext of protecting Paris from the brigands who ravaged its environs. The citizens were instantly alarmed; and Marcel, who had already placed the city in a state of defence, resorted to further measures of security. Upon this occasion was first adopted the memorable expedient of barricading the streets, by stretching across their extremities strong iron chains, attached to large hooks fixed in the walls of the opposite houses†. A party-sign was likewise assumed at the instance of Marcel; it consisted of a hood, half red and half blue, with a clasp bearing the inscription, *A bonne fin*, "To a good end." Many bore it from fear, so that it was useless as an indication of the popular strength. The dauphin being informed of the fermentation of the public mind, assembled a meeting at the *Halles*, and addressed to them a discourse in justification of his conduct, which seemed to give satisfaction. On the following day the provost of the merchants, in his turn, harangued the fickle multitude, at the church of St. Jaques-de-l'Hôpital, and by the vehemence of his eloquence carried them entirely along with him. The dauphin, in the hope of counteracting this success, repaired to the spot with his chancellor, who spoke for him; but the hostile prejudices of the meeting compelled them to withdraw. The triumph of Marcel was completed by the address of an *échevin*, or sheriff, named Toussac, who declaimed so forcibly against the dauphin and his councillors, that the people were in the mood for proceeding to the last extremities against them.

The exasperation of parties increased every day, and all who were known, or even suspected, to be in the interest of the court, were exposed to insult and violence in the streets. At last, on the 25th of January, 1358, Jean Baillet, the dauphin's treasurer, was assassinated in the open day, by a citizen named Perrin Macé, who took refuge in the church of St. Jacques-de-la-Boucherie, which enjoyed the right of sanctuary. The dauphin, naturally irritated at this outrage upon one of his officers, directed Robert de Clermont, marshal of Normandy, to drag the murderer from his asylum and hang him upon the spot,—an order which was promptly carried into execution. The Bishop of Paris, incensed at this violation of the privileges of the church, caused the body of the culprit to be cut down, and ordered it to be honourably interred in the sacred edifice in which he had sought shelter. At the same time the dauphin honoured the funeral of Jean Baillet with his presence. A few days afterwards the university and clergy, with the bishop at their head, openly declared against the course which the dauphin was pursuing; addressing him to that effect, with little ceremony, in an interview at the palace, where the unhappy prince resided, almost in the condition of a prisoner.

At length, on the 22nd of February, Marcel collected about 3000 armed citizens, on the Place de St. Eloi, near the palace; and with a part of this force penetrated into the chamber of the dauphin, of whom he demanded that mea-

* *Literally James Goodman*, the contemptuous nick-name applied *by the noble to the peasant.*

† These barricades were often employed in after times, especially during the wars of the *League* and the *Fronde*; several of the chains were still to be seen before the French revolution.

sures should be taken for the defence of the kingdom, which he would hereafter inherit, and for the protection of the people, who were then abandoned to the ravages of a plundering soldiery. The dauphin, who was surrounded by many prelates, nobles, and knights, consulting Robert de Clermont, marshal of Normandy, and the Sire de Conflans, marshal of Champagne, who were nearest to him, answered, "It is not my business now, it is his who receives the money of the taxes, to provide for the defence of the kingdom." Some bitter words were exchanged between them, when at last Marcel said to the prince, "Sire, do not be surprised at any thing you see;" and then turning to some of his attendants, added, "Come, do quickly that for which you are come here." His partisans immediately threw themselves upon the marshals of Normandy and Champagne, and killed them so close to the dauphin, that the royal dress was sprinkled with their blood. The terrified prince demanded if they sought his life. "Fear nothing, sir," replied Marcel, "but for greater safety take my hood." The dauphin accordingly assumed the party-sign of his enemies, giving his own hood, embroidered in gold, to the provost, who wore it throughout the day as a trophy of his victory. The helpless Charles was then conducted to the Hôtel-de-Ville, where, from a window, he declared to the people that the two marshals were wicked traitors, and that he approved of what had been done towards them.

Violence and disorder now reigned at Paris. Regnault d'Arcy, the king's advocate-general, was killed by the people in a pastry-cook's shop, where he had sought refuge. The Parisians assembled tumultuously, and, to appease them, Marcel was obliged to harangue them from a window of the Hotel de Ville. The dauphin ostensibly approved of the proceedings of the provost, who, in token of acknowledgment, sent him two pieces of cloth, one red, and the other blue, to furnish hoods for the adherents of the court. The Bishop of Paris refused the rites of christian burial to the Marshal of Normandy, regarding him as excommunicated, on account of his violation of the sanctuary of St. Jacques de la Boucherie. Accordingly that personage, together with the Marshal of Champagne, and Regnault d'Arcy, was interred without any solemnities.

On the 25th of March the dauphin secretly quitted Paris. The King of Navarre was immediately received within the city, and proclaimed its captain and governor; and from that time its environs became the theatre of a desolating warfare between his troops and those of the dauphin, who seemed disposed to lay siege to the capital. "The surrounding district," says an old chronicler, "was wasted to the distance of eight or ten leagues; the country was overrun, and the towns burnt." Marcel's intimate connexion with the King of Navarre rendered him an object of suspicion in the eyes of his fellow-citizens; who, although they had rebelled against what they considered to be the tyranny of the dauphin and his counsellors, had no intention of giving themselves a new master, more especially one who had incurred much reproach on account of the horrible excesses of his troops in the vicinity of Paris. Instead of consulting the wishes of the people, the provost of the merchants leagued himself closely with the King of Navarre, and his blind confidence in that ambitious prince proved fatal to him. Several of his acts, openly favouring his royal associate, confirmed the suspicions which the Parisians had previously formed; and the partisans of the dauphin availed themselves of this disposition of the public mind to spread insidious representations against the chief opponent of their master. The report prevailed that a secret treaty had been entered into by the two princes; and the body of échevins deprived the King of Navarre of his title of Captain-General. The incensed monarch departed from the city; and fixing his residence at St. Denis, devastated the surrounding country. At last, on the 19th of July, he concluded a treaty with the dauphin, who promised to pay him 400,000 florins, and engaged to pardon the citizens of Paris, on condition of their giving up the provost and twelve others, whom he should name, "to do with them according to his will." But about the same time Marcel had more than one secret conference at St. Denis with Charles the Bad, whom he still hoped to secure to the popular party, although the very negotiations exposed him to much suspicion. The King of Navarre, on his part, having claims to the French throne, which were only barred by the Salic law, was anxious to obtain possession of the capital; and with this view he desired to be restored to the post of Captain-General. He acceded to the proposals of Marcel, on the condition that the gate of St. Denis, and the fortress or *bastille* above it, should be placed in his hands, so as to afford him at any time an easy entrance into the city with his troops. Despairing of being able to induce the échevins openly to accede to this condition, Marcel determined to change the guards of the post in question, and place there only persons entirely devoted to himself.

On the night of the 31st of July the provost of the merchants endeavoured to carry his scheme into execution; but this bold attempt was baffled and proved fatal to its author, through the desertion, as it would seem, of an échevin, named Jean Maillard, who up to that day had been one of his partisans. On that day, however, Maillard had had a dispute with the provost, owing probably to his refusal to acquiesce in the scheme: the consequence was that he repaired to Pépin des Essarts and Jean de Charny, the chiefs of the royal party, and divulged to them the whole plot. The three betook themselves to the Porte St. Denis, at the moment when Marcel was proceeding to change the guard, and openly accused him of treason, appealing for evidence to the keys which he held in his hand. Maillard mounted on horseback, and, unfurling the banner of France, rode through the streets, crying "*Montjoie Saint Denis au roi et au duc* (for the king and the duke), at the same time denouncing Marcel as a traitor, who wanted to open the gates to the English. At the *Halles* he gathered a numerous body, who followed him to the Porte St. Antoine, whither Marcel had gone, after vain attempts upon some of the other gates; and here likewise repaired Pépin des Essarts and Jean de Charny, at the head of the dauphin's partisans. The unhappy provost, holding the keys of the *bastille* in his hands, mounted the steps, and offered some resistance to his assailants; while, in the midst of the tumult, cries arose of *Death! death! kill the Provost of the Merchants and his accomplices.* Jean de Charny advanced, and with the blow of an axe laid Marcel at his feet, and in this defenceless state, his body was pierced with numerous daggers, until life had departed. His companions, to the number of fifty-four, were likewise slain or dragged to prison. The bodies of the dead were exposed naked in the court of the church of Sainte Catharine du Val des Ecoliers for some days, and then thrown into the Seine.

Three days afterwards, or on the 3rd of August, the dauphin re-entered Paris, having sent before him a great number of his soldiers; and although he issued letters of pardon for all crimes which had been committed against the royal authority, many of the popular party were sacrificed to his vengeance. Among those executed were the treasurer of the King of Navarre, and likewise his chancellor; the latter endeavoured to escape in the disguise of a monk, but being seized, he was put to death, in spite of the remonstrances of the Bishop of Paris. The governor of the Louvre was beheaded, because he had not defended that post successfully against the Parisians, after the dauphin's departure. The King of Navarre, irritated at the failure of his scheme, and at the punishment of his officers, enlisted under his banner a large number of the mercenary soldiers, who then ravaged France; and having made himself master of the environs of Paris, so closely blockaded the city as to reduce the inhabitants to famine. The price of provisions rose to an enormous amount, and Froissart informs us that a small barrel of herrings sold for thirty crowns of gold. Contagious diseases ensued, which were fatal to a frightful extent; so that in the single hospital of the Hôtel Dieu, the deaths reached the number of eighty a day. But the miseries which the citizens thus suffered under the feeble government of the dauphin were, soon afterwards, greatly aggravated by the hostility of a more powerful enemy than the King of Navarre.

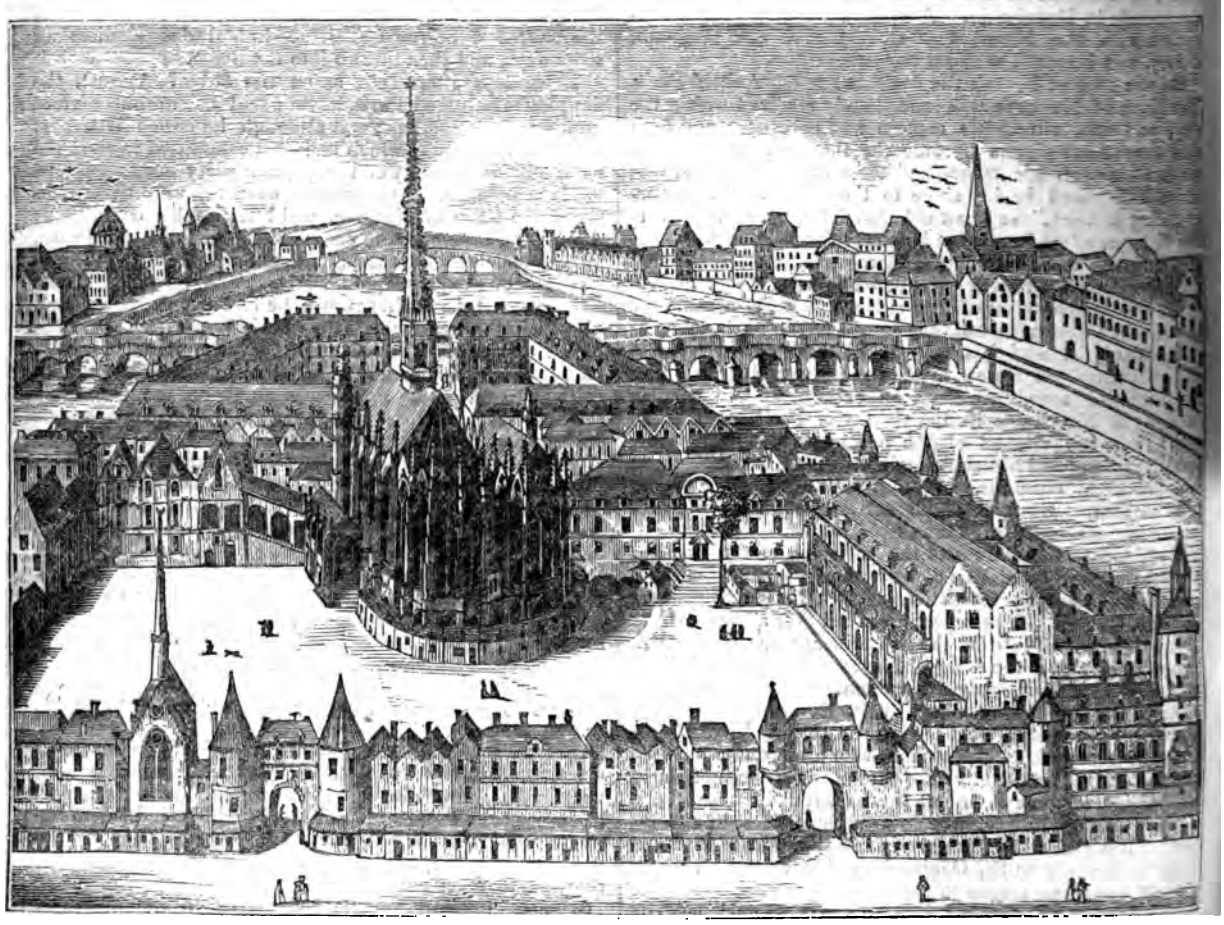
SIEGE OF PARIS BY THE ENGLISH IN 1360.

The captivity which the French king John had endured since the battle of Poitiers, in 1356, becoming at length very irksome, he arranged with Edward III. a treaty for his liberation; the terms of which were highly injurious to the interests of France, but this treaty being rejected by the dauphin and the States-General, the English monarch determined upon another appeal to the fortune of arms. He accordingly disembarked at Calais in the month of November, 1359, with an army of nearly a hundred thousand men; his progress into the country at the head of this force was marked by the usual accompaniments of slaughter and devastation. His approach to Paris was announced by the flying peasantry who sought shelter within its walls; and in the spring of 1360 he encamped

his troops in the plains of Mont-rouge and Vaugirard to the south-west of the city. The dauphin shut himself up within the fortifications, having previously ordered the houses of the suburbs on the southern bank of the river to be burnt, in order to prevent the enemy from taking up their quarters there, but this order was only partially executed as the English troops occupied a portion of the Faubourg St. Germain. Edward was anxious to provoke a battle, and with this view he sent a defiance to the dauphin; but the French prince, more prudent than chivalrous, adhered to his defensive system, and preferred the security of his fortifications to the risk of an open conflict, which might have had the same result as that of Cressy or of Poitiers. A single unsuccessful attempt convinced the English monarch of his inability to carry the city by assault, and he then proceeded, according to the practice of the age, to plunder and devastate the neighbouring country as far as he conveniently could.

In the mean while, the inhabitants of Paris suffered extreme privations; a quantity of wheat equal to about two English gallons sold for a hundred crowns. Money became so scarce that pieces of copper were coined, having in the centre a small portion of gold or silver, and the baser metal was made to pass as equivalent to the more precious one. An order was issued for preventing the clocks of the churches from striking during the night, lest their noise should hinder the sentinels from hearing the approach of the enemy; a single exception was made in favour of the clock which sounded the curfew every evening from Nôtre Dame. For the same reason, probably, the monks chanted their matins at the hour of eight in the evening, instead of at midnight; and this arrangement, we are told, proved so agreeable, that several chapters persisted in it long, after the motive for its introduction had ceased to exist. The superstition of the age is strikingly disclosed in one of the measures resorted to by the citizens for appeasing, as they imagined, the divine wrath, and obtaining a deliverance from the scourge which afflicted them. Under the impression that the favour of Heaven was to be conciliated by an offering of extraordinary cost and dimensions, the provost of the merchants and the échevins decreed that a wax taper of great size should be presented to the church of Nôtre Dame, and, in obedience to a singular conceit, the length of this taper was to equal the circuit of Paris, which was then about 5½ English miles. Day and night it was to be kept burning before an image of the Virgin Mary; and the offering was to be annually renewed in future—a resolution which was constantly observed until the time of the League. A silver lamp was then substituted; and it is recorded that upon the same occasion a blind man offered to Sainte Geneviève two wax tapers, each of which was as thick and as heavy as his own body.

At length the English were obliged to quit the environs of Paris from an absolute want of provisions, the natural consequence of the devastation which they had committed. Edward was by this time convinced, that although he might easily march an army from one end of France to the other, he could not hope to subdue and possess the kingdom; and accordingly, on the 8th of May, 1360, he concluded the treaty of Brétigny, which established peace between the two nations, and restored to the French their captive king. The return of John was an occasion of unbounded joy to the inhabitants of Paris, exposed as they had been to a continual succession of grievous calamities, during the four years of his absence. He entered the city on the 13th of December, amidst the liveliest demonstrations of their affection: the streets through which he passed were hung with tapestry, and at the Porte St. Denis stood fountains, pouring forth wine,—a novel spectacle then in France. The king repaired first to the Church of Nôtre Dame, and thence to the palace, walking under a canopy of cloth of gold, which was borne by four échevins. The city presented him with a service of plate, weighing about 1000 marks, or nearly 8000 English ounces.



BIRD'S EYE VIEW OF PARIS. FROM AN OLD FRENCH PRINT.

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GEORGE THE THIRD'S VISIT TO ST. PAUL'S.

INTERIOR OF THE CATHEDRAL ON THE OCCASION.

If there ever was an occasion on which a whole nation was deeply concerned for the personal well-being of a sovereign, it was in the year 1788, when George the Third, not yet passed what may perhaps be termed the prime of life, was seized with an awful malady which prevented him from superintending those important affairs which devolve upon the monarch of a great country. The details connected with that portion of English history are well deserving of our attention.

In the month of July, 1788, the king prorogued parliament in person, and appeared to be in his usual state of health. But shortly afterwards a slight indisposition came upon him, which induced his physicians to recommend a visit to Cheltenham for a time. This visit appeared to be productive of benefit, and the king returned to Windsor apparently much improved in health. The hopes which had been thus raised, however, were doomed to be of no long continuance: for by the end of October the king had gradually become so ill that it could no longer be concealed that the malady was of a nature peculiarly afflicting and dreadful: a mental derangement had taken place, which rendered him totally incapable of attending to public business.

The parliament stood prorogued to November 20th. On the 14th circular letters were addressed to the members of the legislature, signifying that the indisposition of the sovereign rendered it doubtful whether there would be a possibility of receiving his commands for the further prorogation of parliament. If not, in that case the two Houses must of necessity assemble, and the attendance of the different members was earnestly requested. The delicate position of affairs at this juncture is forcibly described by the Rev. G. R. Gleig, in his *Family History of England*, Vol. III.

A great problem was submitted to the legislature for solution The throne was not vacant, yet the individual

who occupied it was incapable of transacting business: and the calamity having occurred during a prorogation, there seemed to be no power vested anywhere, either to postpone or to hurry forward the period of their meeting. Under these circumstances the houses of parliament assembled on the 20th of November, the day specified in the royal proclamation, but they took no subject into consideration: indeed this meeting was an act of mere form, which was followed immediately by an adjournment for fifteen days. During that interval the king's physicians were examined before the Privy Council, and gave it as their opinion, that though it was impossible to fix the limits of his disease, the king's recovery was by no means to be despaired of. What then was to be done; for who could give the force of law to any Act of Parliament, to which it was impossible to procure the royal assent?

Mr. Pitt was at that time in the administration; and after he had proposed that the journals of the House should be searched, in order to find a precedent which might guide them on the present occasion, Mr. Fox replied, that there were notoriously no precedents which applied to the present instance; that all which was requisite to their ultimate decision had been obtained in the report of the physicians; that he therefore advanced it as a proposition deducible from the principles of the constitution, and the analogy of the law of hereditary succession, that whenever the sovereign was incapable of exercising the functions of his high office, the heir apparent, if of full age and capacity, had as indisputable a claim to the exercise of the executive authority, in the name and on behalf of the sovereign, during his incapacity, as in the case of his natural demise; and that consequently the prince of Wales had a right to fill the throne as a proxy for his afflicted father.

This question of right was warmly disputed by Mr. Pitt, who ultimately carried a motion for inquiry into the best steps to be taken on the occasion. On the 16th of December, Mr. Pitt moved, and the House agreed to, the two following declaratory resolutions: first, one relating to the interruption of royal authority; and a second, stating that it was the duty of parliament to provide the means of supplying that defect. The ministry then proceeded to make the necessary arrangements of appointing a regency. We may here remark, that all parties were agreed as to the propriety of appointing the prince of Wales to the office of Regent during the king's illness; but there were various opinions as to the condition on which that appointment should be made.

On December 23rd a resolution was passed, empowering the lord chancellor to affix the great seal to such bill of limitation as might be necessary to restrict the power of the future regent. Some time after this, as there was a difference of opinion among the physicians respecting the probability of the king's recovery; a fresh committee of inquiry was instituted; but the result did not produce anything satisfactory.

At length a measure was brought into parliament, January 16th, 1789, by which the care of the king's person, and the disposition of the royal household, should be committed to the queen, together with the patronage which belongs to the sovereign respecting appointments to the household, &c.; and that the kingly authority should be vested in the prince regent, during the indisposition of the king, but with certain restrictions respecting granting pensions, creating peers, &c. Violent party debates followed this proposition; but into these we shall not enter. It is more gratifying to be able to state, that while the discussions were still going on, the lord chancellor announced to the House of Peers that the king was declared by his physicians to be in a state of convalescence. This was followed by a declaration, on the *10th of March*, that His Majesty, being perfectly recovered from his indisposition, had ordered a commission to be issued for holding the parliament in the usual manner.

Thus were all difficulties about the regency removed; and the most joyous manifestations at the king's recovery were made throughout the country. In all the considerable towns there were bonfires, illuminations, and holydays; while medals were struck, odes written, and songs composed on the occasion. "Nor," to use the words of Mr. Gleig, "was the feeling diminished when the citizens of London beheld the use to which their beloved monarch first turned his renewed mental vigour. A solemn procession to St. Paul's, and a public thanksgiving to the KING OF KINGS, showed the force of those pure religious principles which gave a turn to all this good monarch's proceedings." The events of that interesting day we will briefly describe.

On the 25th April, 1789, a general thanksgiving was ordered, for the recovery of His Majesty; and on that day the king himself, accompanied by the queen, the prince of Wales, the dukes of York, Gloucester, Cumberland, and Clarence, and the princesses royal, Elizabeth and Augusta, went in solemn procession to St. Paul's cathedral, attended by both Houses of Parliament, the great officers of state, the judges and other public officers, to return thanks to God for the recovery of the king.

The procession began about eight o'clock, by the House of Commons (of whom 167 members attended) proceeding from the House to St. James's palace, towards which other persons, who were to join in the procession, also went. About ten o'clock the royal family left the palace, the king and queen in a state coach, and the other branches of royalty following in other carriages. They were preceded by the members of the House of Commons, the masters in chancery, the judges, the peers, and the lord chancellor. The whole cavalcade passed through the Strand, and the royal coach reached Temple-bar about twelve o'clock. Here they were received by the city authorities, who were mounted on white horses, richly caparisoned, with silver roses, and silk reins, blue and gold furniture, and the fronts of the bridles embroidered with the words, "GOD SAVE THE KING." The lord mayor had a gown of crimson velvet, and the aldermen were correspondingly attired.

The city authorities then preceded the royal visitors from Temple bar to St. Paul's, where they arrived soon after twelve. They were met at the west door of the cathedral by the bishop of London, the dean of St. Paul's, the canons residentiary, and the kings and other officers of arms. The procession then passed into the cathedral in the following order:—The archbishop of York, the lord chancellor, the archbishop of Canterbury, fourteen bishops, the aldermen and common-councilmen, the lord mayor, the earl marshal, the royal dukes, the king, the queen, the princesses, gentlemen pensioners, &c. The other parts of the procession went to the respective places allotted for them. The peers had seats in the area, and the commoners in the stalls: the upper galleries were allotted to the ladies of the queen's bed-chamber, the maids of honour, and such other ladies of distinction as attended on the occasion. The foreign ministers were placed in the two lower galleries next to the throne; and the lord mayor and aldermen in the lower galleries near the altar. But perhaps one of the most striking parts of the scene was the appearance of six thousand charity children, who were seated in a spot prepared for them, and who commenced a hymn directly the royal visitors approached.

The more immediate occupants of the principal part of the building were thus arranged:—the king and queen were on a platform, at the west end of the choir, with a canopy similar to that in the House of Lords, with three ascending steps; the princesses occupied the choristers' seats on the north side of the choir; on the opposite side were the royal dukes: the area of the choir was appropriated by the peers; the judges, masters in chancery, &c., sitting on woolsacks. The peeresses were seated in stalls on each side of the choir.

When all were seated, the service began by a prayer, chanted by one of the minor canons of the cathedral; the responses, which were set to music for the occasion, being made by the whole choir, accompanied on the organ by Mr. Jones. Then followed *Te Deum* and *Benedictus*, which were composed for the occasion, and sung by the choir, assisted, in the choruses, by the six thousand charity children. The *Litany* was then chanted by the Rev. W. Hayes and the Rev. J. Gibbon, minor canons of the cathedral. Then followed the Communion Service, which was read by the dean and the residentiaries. The *Kyrie Eleison* and *Creed*, arranged by Purcell, were then sung by the whole choir, accompanied on the organ. After this followed a sermon by the bishop of London, from the text, Psalm xxvii. 16: "Oh tarry thou the Lord's leisure: be strong, and He shall comfort thine heart: and put thou thy trust in the Lord."

The sermon was followed by an anthem, composed for the occasion, and the service was concluded by the offertory, which was read by the Rev. Dr. Farmer. The whole ceremony lasted until three o'clock.

The king was dressed in the Windsor uniform. The queen and the princesses wore blue silk dresses, trimmed with white; and they, as well as nearly all the ladies present, had bandeaus on which were inscribed "God save the King." Most of the gentlemen wore purple and white sword-knots, with a similar inscription.

When their majesties were leaving the cathedral, the whole of the charity children sang the 104th Psalm, with an effect that can only be understood by those who have attended the cathedral on the annual assembly of the charity children there. The cavalcade then returned to the palace nearly in the same order in which it left there in the morning.

We have no space to detail the round of festivities which followed this visit to St. Paul's; nor is there much necessity for so doing. Illuminations, grand banquets, and congratulatory addresses, are frequent attendants on occasions of public rejoicing; but the visit of all the great and noble in the metropolis—we may almost say in the kingdom—to St. Paul's cathedral, and the performance of divine service there, was an event worthy of being singled out for remembrance by subsequent generations.

It must be known to our readers, that the recovery of the king was not doomed to be followed by lasting health. The last years of George the Third's life were passed in that privacy which was a necessary acompaniment of an alienation of intellect: an alienation which disqualified him alike from governing a kingdom, and from enjoying the usual pleasures of a rational mind.

AUTHORS should avoid as much as they can replies and rejoinders, the usual consequences of which are loss of time, and loss of temper. Happy is he who is engaged in controversy with his own passions, and comes off superior; who makes it his endeavour that his follies and weaknesses may die before him, and who daily meditates on mortality and immortality.—JORTIN

KIMMERIDGE COAL-MONEY.

IF the reader will refer back to p. 31 of this Volume, No. 453, he will find a drawing and an account of a very curious and mysterious article, which was there termed KIMMERIDGE COAL-MONEY, from the circumstance that the substance of which it is composed is of a *coaly* nature, is in shape and figure like pieces of money, and is found in the Bay of Kimmeridge, in Dorsetshire.

When we put forth the article in question, we thought that we had said all that could be safely said respecting these interesting remains of antiquity, in describing their locality and their existence, and pointing attention to the potteries of the Phœnicians; but a correspondent having furnished us with some very clever and feasible suggestions, which help to carry out the subject of the coal-money, and to account for its existence, we feel it our duty to give our readers generally the benefit of his reflections.

Mr. Jabez Allies, of Catherine Villa, near Worcester, observes that such pieces, or blocks, called *coal-money*, were most likely used as models or moulds in making the pottery at the Phœnician settlement in the Isle of Purbeck; and that several of these blocks, placed one upon another, from the smallest to the largest, and then *vice versâ*, formed a model for an urn or a vase from the small of the foot to the top; and the foot might have been formed in the same manner by reversing one or two blocks; and such blocks being larger on one side than the other, would exactly suit such a purpose. The potter, in order to make a great number of vessels of the same size as the pattern, (either at the wheel or in the lathe,) had only to use a pair of compasses or callipers occasionally; and although experienced hands might not always have wanted such assistance, yet the learners in the art most probably required it.

A single block, with the largest size upwards, is the exact shape of a *patera*, or goblet, and might have been used either as a mould in making that article, or as a model to regulate the size of such pottery, on turning the clay, either at the wheel or in the lathe.

Whole urns or vases (particularly those which were too small in size to admit the hand of the potter into the interior of them at the wheel) might also have been made with these different sized blocks, by forming circles of clay upon the rims of them, and then by taking out the blocks before the clay was dry, and neatly and firmly fitting the circles of clay upon one another; and afterwards such urns or vases, when dry, might have been turned in the lathe.

The devices on some of the blocks were probably used in fitting or steadying one block upon another, and occasionally in making impressions upon the clay. If any of the fragments of the pottery should be found to contain similar stamped marks, it might lead us to infer that some of the devices at least were made and used as patterns to assist the unpractised workman in forming circles, &c. on the pottery.

The large stone, resembling a piece of coal-money, mentioned in the former paper as lying in the Bay of Worthbarrow, most probably was a mould for very large pateras, and might have been chiefly used for sacrificial purposes. The earthenware patera which was found, containing a young bullock's head, appears to corroborate this hypothesis. In conclusion, the ancient monument situate at the N. E. extremity of Purbeck, called Degle-stone, or Stone-Barrow, is said by several writers to have the character of the *Logan** stones of the Britons or Phœnicians. Some persons likewise consider the antique remains here alluded to to be of a Romanized British character

* See *Saturday Magazine*, Vol. VII., p. 183.

THE PENDULUM. IV.

THE compensation-pendulums described in the last paper, have all been tried, and have succeeded in performing their office; but they have never become so common as the *gridiron*-pendulum, which, though more complicated than the rest, is by far the best known, because it was one of the first attempts to make the expansions of different metals counteract each other.

This pendulum was invented by Harrison, in 1726, and frequently goes by his name. But, before describing it minutely, we will consider the principle on which it acts, in the case of another form of pendulum.

Suppose a pendulum to be constructed, as in the annexed figure, where the rod A, instead of passing directly from the spring to the bob, bears at its lower end a short piece of metal, from which rises the rod B, of a more expansible material than A, and bearing at its top a cross-piece D, from which hangs the long bent rod C, of the same material as A, and holding the bob. In this arrangement the rods A and C must, when heated, expand *downwards*, because they hang, or are fixed, by their upper ends: but the rod B can only expand *upwards*, because it has its lower end fixed. Now, although the entire length of the rod B cannot obviously be so great as that of A and C together, yet, by making it of a different metal, we may cause its expansion, under a certain increase of temperature, to be just the same as that of the greater length contained in A and C together. Then the expansion *upwards* will be as great as the expansion *downwards*, and the tendency to *raise* the bob as great as the tendency to *lower* it; and the bob will therefore never move, but remain in the same place both in hot and cold weather, unaffected by the expansion or contraction of the rods, by which it is suspended. In order to effect this, the rods must bear a certain ratio to each other, depending on the different expansibilities of the metals *steel* and *brass*, which are commonly employed.

Fig. 13.

The expansibility of brass, compared with that of steel, is as 1 to ·6091; that is to say, if a brass rod of a certain length, exposed to a certain increase of heat, expands one inch, then a steel rod, of the same length, exposed to the same increase of heat, will expand ·6091 of an inch. Now if we want two bars, one of brass and the other of steel, which (though unequal in length) shall expand equally, for equal increments of heat, the steel rod must obviously be longer than the brass, in the ratio of 1 to ·6091. Therefore, in the pendulum shown above, the brass rod B must be ·6091 of the length of the two steel rods A and C together; and the difference between these two lengths, or the length of the rod A, must (for seconds) be about 39¼ inches. Hence, the whole length of the apparatus will be more than five feet: there will be nearly as much of the pendulum-rod above as below the point of suspension; and, in all clocks, the pendulum, if constructed in this manner, will be nearly double its usual length—an affair manifestly awkward and inconvenient.

The long rods B and C are, therefore, each divided into two portions; that is, instead of one brass rod, to compensate two steel ones, there are two brass rods, to compensate three steel ones; and thus they can generally be all made of about the same length, provided that the total length of the brass be to that of the steel as ·6091 to 1, and that all the brass rods expand upwards, and the steel downwards. Then the piece D is not above, but rather below, the point of suspension; and the rod C, instead of bearing the bob, bears a cross-piece, from which rises a second brass-rod, having on its upper end a cross-piece, from which hangs a steel rod, bearing the bob. Thus there is the expansion of two brass bars upwards, to compensate for that of three steel bars downwards; and this is generally found sufficient. Care must, however, be taken that the ratio of brass to steel be preserved, how many bars soever we use; else the brass may over-correct the steel, and consequently the pendulum may *shorten by heat* and *lengthen by cold*, contrary, in appearance, to the ordinary law of the case.

As the gridiron-pendulum, so called from its appearance, is usually constructed, the whole of this arrangement is doubled, in order to preserve a symmetrical figure and steady frame-work. It then consists, (as shown in the annexed figure) of nine parallel bars, all lying in one plane. They are alternately steel and brass, beginning and ending with steel, (which is represented by the darker bars in the cut); and they are connected together by cross-bars of any substance in the following peculiar manner.

Fig. 14.

The two long cross-bars AA are only fixed to the two outer steel bars. All the other rods pass through large holes made in AA; so that these cross-pieces do not at all interfere with the motions of the rods. They have, therefore no influence on the compensation, and may be neglected; for their only use is to strengthen the combination, and form with it a compact frame-work. The central rod is of steel, and hangs from the cock by a spring, as in the common pendulum. It answers to the rod A in fig. 13, and passes through large holes in the two uppermost cross-pieces, so as not to touch them; but it carries at its lower end a very short cross-piece, from which rise two brass bars, one on each side, answering to B in fig 13. These support on their tops a rather longer cross-piece, from the outer ends of which hang two other steel bars, carrying at their lower end a still longer cross-piece, which supports two more brass bars. These are connected at the top by a yet longer cross-bar, from the ends of which hang the two outer steel rods, whose lower ends are likewise connected together; and from the centre of the connecting piece hangs the bob, which can be adjusted by a screw, as in the common pendulum. An attentive examination of fig. 14. will soon convince the reader, that it acts on the same principle, as the rude specimen shown in fig. 13.

Although this is the most common, it is by no means the best form of the gridiron-pendulum. The most elegant modification of it is that called *Troughton's tubular pendulum*, in which the bars are not placed all in the same plane, but are arranged in a much more compact form, so as to be all enclosed in a tube or sheath, not much more than half an inch in diameter; by which means the whole apparatus is concealed and presents the neat appearance of the simple pendulum, but with rather a thick rod.

In our last paper we described a very simple compensation, effected by a compound bar of brass and

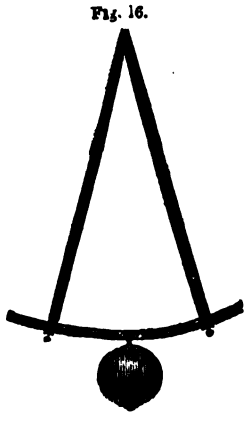
steel, which, owing to the different expansibilities of those metals, warps or bends by variations in temperature. In fig. 15, is represented another compensation, by the same means, but acting on a different principle.

Fig. 15.

This is called *Doughty's pendulum*. In it the bob is suspended by two rods BB, which hang by springs from two heads, which slide backwards and forwards on the compound bar A, and are fixed at any part of it by screws. This compound bar is suspended, as shown in the figure, by a short rod fixed to its centre, and having at its upper end a spring to allow it to oscillate freely. The two bars BB are connected at bottom by a short cross-piece, from which the bob hangs by a rod; the lower end of which is cut like a screw, to receive the nut which adjusts the height of the bob.

As the steel side of the bar A is placed uppermost, the ends of this bar will bend upwards by heat, and downwards by cold, for the reasons given in the last paper. Now as the bob is connected with the ends of A by the rods BB, it will be raised in hot weather; and the proportions of the different parts are so managed, that this raising of the bob through the effect of heat, exactly counterbalances the sinking which it would experience by the lengthening of the rods BB through the same cause. Again in cold weather the bob would be raised by the contraction of BB, were it not that the cold likewise causes the compound bar A to bend on each side downwards; thus keeping the bob always at the same distance from the point of suspension. If the bar A over-corrects the expansion and contraction of the rods BB, the sliding-heads of these rods must be slid inwards, and fixed nearer together; by which means they will not be raised and lowered so much by the bending of A. On the contrary, if the bar A does not bend enough to counterbalance the expansion and contraction of B B they must be separated more widely from each other, that they may be more affected by the warping of the compound bar. It evidently matters not which end of this pendulum is placed upwards. It might have the bob attached to the bar A, and the pendulum spring for suspending it, at the place where in fig. 15 the bob is attached. Such a pendulum is represented in fig. 16: its action will soon be understood by inspecting the figure; but it must be remembered that, in this case, the steel side of the compound bar must be placed downwards.

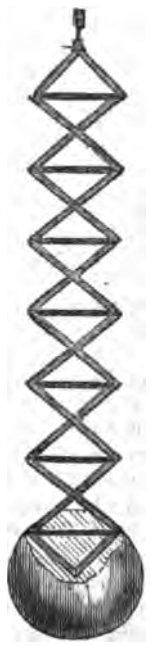
Fig. 16.



We will describe the principle of one more compensation-pendulum. It is that of Troughton, called the *Rhomboidal pendulum*, which was also invented about the same time by Williams, a clock-maker of Ulverston, in Lancashire.

If we suppose four bars of steel to be fixed firmly together at their ends, so as to form a square frame; as each side of this square expands by heat equally, the whole square will enlarge in size without altering in form. But, let the bars be connected at the angles by joints, then the slightest force applied to two opposite angles of the frame, will make it change its form to that of a *rhombus*, by lengthening one diagonal and compressing the other. If, however, a diagonal bar be added, connecting two opposite angle of the frame, it will, by a well-known principle in engineering, become a *rigid system*, or one whose form cannot be altered by any force that will not bend or break the bars. To apply this, however, to the present subject, let this diagonal rod be made of brass, or of any more expansible metal than that of which the sides of the frame are made. Then the lengthening of this diagonal bar will tend to push asunder the angles at its extremities, and alter the form of the frame by causing the other angles to come nearer together. But the expansion of the side-bars tends to separate these angles: and these two tendencies may be so nicely counterbalanced, as to keep these angles always at the same distance, however much the others may be separated by the lengthening of the diagonal rod. If, therefore, the whole frame were suspended by one of these corners, and a bob attached to the other, it would form an invariable pendulum-rod quite unaffected as to length by changes of temperature.

Fig. 17.



Such a pendulum, however, would be very clumsy, being at least as broad as long. Several small rhomboidal frames are therefore joined together, and this forms Troughton's pendulum, represented in the annexed figure. It must be remembered that all the angles are joints; that the horizontal rods are brass; and the others steel.

When a young woman behaves to her parents in a manner particularly tender and respectful, I mean from principle as well as nature, there is nothing good and gentle that may not be expected from her in whatever condition she is placed. Of this I am so thoroughly persuaded, that, were I to advise any friend of mine as to his choice of a wife, I know not whether my first counsel would not be, "Look out for one distinguished by her attention and sweetness to her parents." The fund of worth and affection, indicated by such a behaviour, joined to the habits of duty and consideration thereby contracted, being transferred to the married state, will not fail to render her a mild and obliging companion.—Fordyce.

Trade increases the wealth and glory of a country; but its real strength and stamina are to be looked for among the cultivators of the land. In their simplicity of life is found the simpleness of virtue—the integrity and courage of freedom. These true genuine sons of the earth are invincible; and they surround and hem in the mercantile bodies:—even if these bodies, which supposition I totally disclaim, could be supposed disaffected to the cause of liberty.

How oft it haps, that when within
They shrink at sense of secret sin,
A feather daunts the brave;
A fool's wise speech confounds the wise,
And proudest princes veil their eyes
Before their meanest slave.—Sir Walter Scott.

PHILOSOPHY OF A SOAP-BUBBLE.

III.

THE collection of facts which we have been hitherto detailing might seem useless and unlikely to lead to any important result, if we did not now endeavour to explain *why* these things happen; and we shall find the inquiry will afford us much information respecting that mysterious body, *light*, concerning the real nature of which we are quite ignorant.

Whatever light may be, this is certain, that a ray of it touching any surface whatever must always undergo one of these three effects: 1st, it is *reflected;* that is, it bounds off according to the laws of Mechanics, without entering the surface; or, 2nd, it is *transmitted,* that is, it continues its course through the body, in a certain direction determined by the laws of Optics, and emerges on the other side of the body; or, 3rdly, it is *absorbed,* that is, entirely extinguished, or so changed as to be no longer light.

Now a beam of white light is a large collection or bundle of single rays, of at least three different kinds, colours, and properties, and differently acted on by the bodies they touch. They are all mingled in solar light; and when such a beam of light falls on an *opaque* body, it is divided into *two* parts: one part is *absorbed,* the other *reflected;* and on the colour of this reflected portion depends the colour of the body. Suppose light to be composed of red, blue, and yellow rays; and suppose a body so acts on this light as to absorb the red rays; then it must reflect yellow and blue rays, which, mixed, form green light; so that that body appears, or is, of a green colour. Hence the absorbed and reflected portions together must form white: in the above instance, the absorbed portion is red, the reflected portion is green; and the red and the green, if again mixed, would form white light. Two colours, which, when mixed together, form white, are said to be *complementary* to each other.

Opaque black bodies absorb all the light that falls on them, and reflect none. Opaque white bodies are those that reflect nearly all, and absorb hardly any.

But with *transparent* bodies, the light is divided into *three* portions. One part is *absorbed,* another is *reflected,* and a very considerable part is *transmitted.* On the colour of the reflected portion depends the colour of the body, when we look *at* it; and on the colour of the transmitted portion depends the colour, when we look *through* it. Thus, many bodies, such as opal and opal glass, appear of a different colour when looked *at,* than when looked *through.* These three,—reflected, transmitted, and absorbed light, would, if mixed together, form white.

But with *white transparent* bodies, as common glass, water, air, soap-bubbles, &c., the absorbed portion is either exceedingly small, or all the colours are absorbed equally; so that the absorption has no effect on the colour of the body, and may safely be left out.

Thus we may consider the light falling on such bodies as being partly *reflected* and partly *transmitted.*

In ordinary circumstances, glass, water, air, &c. reflect a mixture of all the colours, and also transmit a similar mixture, so that both the reflected and transmitted light is white; but this is not always the case. The phenomena we have been describing, show that all such bodies, reduced to very thin plates, reflect some peculiar colour depending on their thickness. Now, if the white light falling on such bodies is divided into two parts, these two parts, the reflected and the transmitted, must be complementary to each other, or must, if mixed, form white. Now the complementary *colour of* blue is known to be orange; therefore, if a *very thin plate* reflect blue light when we look at it, and absorb none or very little, it ought to look orange by transmission, when we view *through* it, if all this be true.

It does look so, thus accounting for the whole of the light which falls on it, which is disposed of thus:—the blue rays are reflected, and the red and yellow are transmitted, which mixed form orange; and the orange and blue if mixed would form white light, such as first fell on the plate. It is the same with all the other colours of thin plates, as the reader may prove by his permanent soap-bubble, by stooping down and looking up through it. He will then see a series of stripes or arches of colours; and under every blue stripe on the upper surface will appear an orange stripe on the lower surface; the two colours being in every case complementary. In the first order, for instance, under the black space will be a white one; because all the rays falling on this space are transmitted, and reach the eye from *below* the film, but none are reflected so as to meet the eye when placed *above* the film; and from *thence* it appears black. On the contrary, the first arch, which is white from above, will appear dark from below; because all the rays are reflected, and none are transmitted: the film is, in fact, almost opaque, no rays passing through it. The next arch appears, from above, yellow, which is the colour which it reflects; but from below it will appear of a purplish gray, the complementary colour to yellow. All the other stripes act in the same manner, as is distinctly seen in Newton's rings.

It must be remarked, however, that the transmitted rings are never so brilliant as the reflected ones, but are usually very faint; being diluted with some simple white light, which passes through the film unchanged. Owing to this faintness, more than five rings or orders can never be observed by transmission; while by reflection there are generally seven orders of colours.

Now, before we inquire why a mixed beam of light is thus acted on by a very thin plate, it will be well to consider the action of thin plates on *homogeneous* light, or light entirely of one colour unmixed with any other. Such light is very difficult to obtain, but for all common purposes it will be sufficiently pure as obtained from coloured flames, or by passing light through coloured glass, or through a prism. The reader probably knows that by a prism, light is decomposed into the seven colours;—red, orange, yellow, green, blue, indigo, and violet, which may be received on a screen, and form a coloured image called the *prismatic spectrum.*

If a slit or hole be cut in this screen, so as to allow any particular colour to pass through, but to stop all the others (which is easily done), we have, behind the screen, a beam of homogeneous light of that colour. Such light is *simple:* it cannot again be decomposed by another prism.

Now when we look at a thin plate, or a soap-bubble, in such light, say *red* light, the plate cannot, evidently appear of any other colour but red; for there is no other colour to reflect or transmit. The plate will then act thus. At the very thinnest part, where the black spot appears in common light, all the red light is transmitted, but none is reflected. Therefore, this part appears black by reflection, but red by transmission. At a part a little thicker than this, is a space which reflects all the light, and transmits none; such a space is red when looked at in front, but black from behind. The next stripe is black in front but red behind, and so on alternately. If the lenses likewise be examined in such light, there will be a series of rings, alternately black and red, with a black spot in the middle by reflection. But when looked *through,* the case is reversed; there is a red spot in the middle;

and for every black ring in front, there is a red one behind; and *vice versâ*. In any other kind of homogeneous light, the effect is similar; except that the light rings are of the colour of the light in question, instead of red. The other rings are always black. The reader may examine his permanent bubble by homogeneous yellow light, by dissolving some common salt in a little spirit of wine, and lighting it in a dark room.

When, however, the action of thin plates on various *coloured* lights is seen, there is one remarkable circumstance which accounts for the various colours seen in *white* light. It is this, that, if we examine Newton's rings in red light (which is the least *refrangible* kind of light), we shall observe the stripes or rings of black and red to be much broader than the stripes of violet and black in violet light, which is the most refrangible. All the other prismatic colours produce stripes or rings of intermediate breadths, according to their refrangibility; but between red and violet, or the broadest and narrowest rings, the difference is so marked as to be instantly recognised by every observer.

Now, when white light, or a compound of all the simple colours, is employed, each kind of coloured light forms its own peculiar system of rings. If all the rings were of the same breadth, all the dark rings would coincide and form black, and all the coloured ones would coincide and form white, and a system of alternate black and white rings would be the result. But, as the rings of the different colours are not of equal breadth, they do not coincide, but mix in different proportions, and form a system of colours. Thus, if we could find any transparent colours, exactly resembling those of the spectrum, and seven circular pieces of glass were taken; the first painted in black and red stripes to represent the appearance of the bubble in red light, another like its appearance in orange light, and so on; and all these painted glasses were superposed, and looked through at once, they would present the appearance of the bubble in white light.

How common it is for men first to throw dirt in the face of religion, and then persuade themselves it is its natural complexion! They represent it to themselves in a shape least pleasing to them, and then bring that as a plea why they give it no better entertainment.——STILLINGFLEET.

THERE is no manner of inconvenience in having a pattern propounded to us of so great perfection, as is above our reach to attain to: and there may be great advantages in it. The way to excel in any kind is, to propose the brightest and most perfect examples to our imitation. No man can write after too perfect and good a copy; and though he can never reach the perfection of it, yet he is like to learn more than by one less perfect. He that aims at the Heavens, which yet he is sure to come short of, is like to shoot higher than he that aims at a mark within his reach.——TILLOTSON.

"To be born a king is a matter of chance; never forget that you are man;" said the late great King of Prussia to his nephew in his will. A sentiment that did him more honour than all his victories.

IT was a shrewd saying of the old monk, that two kind of prisons would serve for all offenders in the world, an Inquisition and a Bedlam. If any man should deny the being of a God, and the immortality of the soul, such a one should be put into the first of these, the Inquisition, as being a desperate heretic; but if any man should profess to believe these things, and yet allow himself in any known wickedness, such a one should be put into Bedlam.——TILLOTSON.

As he is a fool indeed that thinks a bead better than a pearl, and prefers a cockle-shell before a crown, such a fool is every sinner.——BISHOP BEVERIDGE.

SICKNESS—DEATH—THE GRAVE.

In the house a sick man lies,
Writhing in his agonies;
In his chamber silence keep,
Leaving it to moan and weep;
In his presence strive to smile,
Though your heart be sad the while,
Though a dread unseen, intense,
O'er you hang in dim suspense.
In the house is noiseless stir—
Friends with anxious friends confer—
Whisperings are upon the stair—
Active service everywhere;
Not a window in the night,
But doth show some glancing light;
Fond ones to his door still creeping,
Listening if he yet be sleeping;
Thrilling at the languid tone
Of his faint and fruitless moan;
Praying with that earnest prayer
Born so often of despair.

In the house the same man lies—
Past are now his agonies;
All the anxious stir is o'er—
Flitting forms are seen no more.
Close the shutters! shun the light!
Come not into strangers' sight!
Veil the steps! be awed! be dumb!
A regal visitant hath come.
With that sick man doth he rest,
An uninvited, mighty guest.
Glide like shadows—hush the breath—
That regal visitant is Death!
In his shroud the dead man lies—
Dreamless slumber seals his eyes;
The shock that bid his pulse be still
Seems around to spread its thrill,
On each mourner's soul and sense,
With a numbing influence.
Busy labour come not near!
Sorrow keeps her Sabbath here;
Laughter! how discordant grown,
Now would seem thy softest tone;
Even the children's mirth is mute,
Lightly falls each little foot;
Near each other oft they draw,
With a dim, mysterious awe,
Soothing by companionship,
Fears that may not pass the lip;
See them to that chamber brought,
Death's first lesson to be taught—
The first conviction bringing nigh
Of their own mortality.

In his grave the dead man lies,
Needing not our sympathies!
Once again the house is rife,
With elastic, stirring life;
Gone hath that once precious clay
With its royal guest away.
Ah! that what was once so dear,
Should have grown a thing to fear!
Is it not some cause for grief,
That its departure was relief?
Light again is in his room,
Past the sable signs of gloom.
Though his memory oft is blessed,
Though deep sadness fills the breast,
His power to awe and thrill is o'er,
Remembrance doth his form restore,
Without that dim, vexatious dread,
That shrouds the most beloved dead.

[M. A. BROWNE, *in the Dublin University Magazine.*]

IT is commonly allowed that the science of human nature is of all human sciences the most curious and important. *To know ourseleves* is a precept, which the wise in all ages have recommended, and which is enjoined by the authority of revelation itself. Can anything be of more consequence to man than to know what is his duty, and how he may arrive at happiness? It is from the examination of his own heart, that he receives the first intimations of the one, and the only sure criterion of the other.——BEATTIE.

THE EVERGREEN CYPRESS

Thou graceful tree,
With thy green branches drooping
As to yon blue heaven stooping,
In meek humility.
Thou wert made to wave,
Patient when winter winds rave o'er thee,
Lowly when summer suns restore thee,
On some martyr's grave.
Like that martyr thou hast given
A lesson of faith and meekness,
Of patient strength in thy weakness,
And trust in Heaven.

THIS valuable and graceful tree is a native of the south-eastern countries of Europe, of the Levant, of China, and of several other parts of Asia. It has not been cultivated in England to any extent, for, although it is not much affected by the cold of our winter season, yet the dampness of our summer often proves fatal to it. It has become a favourite ornament of our lawns, owing to the deep hue of its evergreen branches and leaves, and the peculiarity of its upright growth. A warm sandy soil is the best adapted to it, and in its native countries, on the slopes of hills, it will attain an elevation of forty or fifty feet. Like many of the *Coniferæ*, or cone-bearing trees, the durability of its timber seems to depend chiefly on the slowness of its growth; for, in situations where it has met with too rich a soil, we find it deficient in that extreme closeness of grain and texture, which is observable in those of slower growth, and which forms the chief excellence of its timber. We find that the cypress was held in high esteem by the ancients, on account of the imperishable nature of its wood. The coffins in which the Egyptian mummies are found are usually made of cypress; and the Athenians, in order to preserve the remains of their heroes, buried them in coffins of the same material. Pliny mentions a statue of Jupiter, which had lasted six hundred and sixty-one years; while the doors of the church of St. Peter's, at Rome, formed of cypress, are stated to have been eleven centuries old, and still showing no signs of decay, when they were taken down by Pope Eugenius the Fourth, to be replaced by gates of brass. Perhaps there would be no small difficulty in getting connected evidence of the identity of these doors, through so wide a space of time; but whatever may be the truth of these accounts of the durability of the cypress, there can be no doubt but that it forms the hardest and most lasting of timber.

Where the cypress grows in sufficient abundance it is extensively used in building, and nothing can be better adapted to the purpose than a timber thus resisting the effects of time, and, in consequence of its bitter juices, impervious to the attacks of insects. The inhabitants of Crete and Malta are well aware of its advantages for this purpose, and find their dwellings, constructed of this timber, almost as lasting as if they had employed stone itself.

The cypress is one of those trees which has been considered peculiarly fitted for a place of burial; and this not only on account of its dark and sombre foliage, which gives it a melancholy character, much in accordance with such a situation, but also as a memorial of immortality, of which its surprising durability constitutes it a faint emblem. It was consecrated to this purpose in ancient times, and the remembrance of this fact can scarcely fail of exciting interesting associations whenever we view the tree: indeed the practice of planting these trees near the graves of departed friends, is not uncommon with us now.

Not long since the writer had an opportunity of observing an affecting instance of the continuance of this custom. Wandering through a picturesque little village in the south-west of England, his steps were directed to a small but ancient-looking church, situated on the declivity of a hill, and surrounded by its few simple mounds of earth and scattered grave-stones. He soon observed, a little removed from the rest, a slight iron railing, surrounding, not a tomb, not a grave-stone, nor even a mound of earth, but a single graceful cypress tree. The turf was fresh and green at its root, and the beautiful young tree waved freely in the morning air, speaking more tenderly and truly, by its hue and its bending form, of the sadness of earth; and by its nature and character, of the hope of immortality, than the most costly marble tomb or laboured epitaph could have done. He made inquiries in the village concerning this memento of affection, and found that it had been planted in memory of one, "the only son of his mother, and she was a widow."

The cultivation of the cypress tree was much attended to by the celebrated Evelyn, who had upwards of two thousand of them on his own grounds at Sayes Court, and whose experience of their capability of bearing severe frosts without injury, goes to prove that there might be some prospect of raising them to a tolerable size, as timber trees, in the southern parts of this kingdom. It is doubtful, however, considering the frequent changes of our climate, whether the timber thus raised would possess those qualities which make the foreign sorts so valuable.

There are several uses to which cypress wood might be applied, and to which it seems remarkably well adapted. Its elasticity, united with hardness, would make it a valuable material for musical instruments; and it might be used for furniture with as good effect as mahogany; for though not quite so beautiful in colour, it is still very handsome; it resists the worm equally well, and is much stronger. The odour of the cypress would also repel insects, and preserve the contents of cabinets which might be formed of it.

THE hunting tribes of air and earth
Respect the brethren of their birth;
Nature, who loves the claim of kind,
Less cruel chase to each assigned.
The falcon poised on soaring wing,
Watches the wild duck by the spring;
The slow-hound wakes the fox's lair,
The greyhound presses on the hare;
The eagle pounces on the lamb,
The wolf devours the fleecy dam;
E'en tiger fell, and sullen bear,
Their likeness and their lineage spare;
Man only mars kind nature's plan,
And turns the fierce pursuit on man.—SIR W. SCOTT.

IT was an objection constantly urged by the ancient Epicureans, that man could not be the creature of a benevolent being, as he was formed in a state so helpless and infirm; MONTAGUE took it, and urged it also. They never considered or perceived that this very infirmity and helplessness were the cause and cement of society: that if men had been perfect and self-sufficient, and had stood in no need of each other's assistance, there would have been no occasion for the invention of the arts and no opportunity for the exertion of the affections.—DR. WARTON.

As the worm eats out the heart of the plant that bred it, so whatsoever is done amiss, naturally works no other end but destruction to him that doth it.—HALE.

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THE ABBEY OF JUMIÈGES.

RUINS OF THE ABBEY OF JUMIÈGES.

On entering the mouth of the Seine with the rising tide, and following the capricious windings of that river, many interesting objects appeal to the notice of the antiquarian traveller. Harfleur is soon recognised by its high steeple, built by the English, "the monument at once of their reign and of their defeat," as it is now regarded by the French historians; then Quillebœuf-point, to which a sad celebrity is attached, on account of the numerous shipwrecks which it has witnessed; then we see Caudebec and its little port, where a few solitary fishing-boats are reposing. We then perceive on the left bank of the river two towers, (one of which is very ruinous,) thrown out in clear relief upon the blue sky. During the day, these towers serve as a landmark to vessels, being discovered at a great distance; and towards the close of a fine day, when the air is pure and transparent, they seem to be two white phantoms standing on the shore. Isolated as they are, at the extremity of one of the islets formed by the sinuous course of the Seine, these two towers, which from a distance would seem to announce your approach to some large city, are found desolate and alone, the abode merely of families of birds, whose shrill cries have superseded the sonorous tones of bells and the solemn chants of the church.

There was formerly in that spot a rich and celebrated abbey, whose origin may be traced back through ages to the early period of the French monarchy. Jumièges, so long the abode of the austere and learned monk, had already become celebrated in the time of the first successors of Clovis. Traditions

says, that in the year 640, in the reign of Dagobert, St. Philibert and a few other cenobites* chose, at five leagues from Rouen (a very small borough at this distant period), the islet of Jumièges for their retreat. They built a monastery there, which in following ages was gradually enlarged and embellished. By degrees it became an abbey of the Benedictines, and all the wondrous resources of Gothic architecture were lavished upon this establishment. There were added gradually to Jumièges those elegant columns, those light and bold arches, and those wondrous specimens of sculpture, whose very ruins at the present day excite so much admiration. Stone was made to assume the most graceful forms: it was carved into lacework, cut out into statues of the saints with incredible delicacy, and into arabesques, in which was displayed a richness of imagination which might seem to belong to fairy-land. Thus was Jumièges enlarged and adorned by masons, the meanest of whom seems to have been an accomplished artist; and yet scarcely one of the authors of so many wonders has left behind him a name. How rich in the arts must have been these middle ages, (*dark ages*, as they are sometimes called,) which thus scattered on all sides, as every-day work, so much magnificence and so many wonders!

Some years after the founding of Jumièges, when the poor and humble monastery had no other fame than that which arose to it from the holiness of its inmates, Philibert, the founder and first abbot of Jumièges, accompanied by one of his monks, was walking on the banks of the Seine, blessing God for the peace which He had given to his servants in that holy seclusion during a time of cruel war and devastation, when suddenly he perceived, at a distance, a vessel without sail or oars floating at hazard on the river, and carried about by the winds and waves.

As this boat came on with the current, Philibert could perceive that it had not been abandoned by the fisherman as a prey to the storm, as he at first imagined. A man was in the boat, and he allowed himself to be borne along the stream, without making any effort to direct his course. At length the little vessel was carried by the waves to the place where the abbot stood; and what was the astonishment of Philibert, when he saw two young persons extended on rich cushions at the bottom of this frail skiff: they were weak and pale; their arms were bound up with linen which was still bloody. The man who was sitting up in the boat said to the abbot, "These are the two sons of our master, Clovis the Second, *unnerved* by order of the king their father:" and such indeed was the case. To punish his sons for the crime of rebellion, the king had caused them to be *unnerved;* that is to say, he had had the nerves of their arms severed, so as to make it impossible for them ever after to handle a sword; and this punishment was equivalent to being set aside from inheriting the throne; for in these warlike times, the prince was little more than a captain whose peculiar privilege it was, to move at the head of his army into the battle-field. The nobles of the kingdom, who at first demanded the death of the young princes, were with difficulty appeased by this sentence. The two unhappy youths were cast into a boat without sails or oars: provisions were given them, and a man to wait on them, and thus they were abandoned to their fate, and left to the mercy of Him who rules the winds and waves. From that little borough, which is now become the splendid city of Paris, down to the place where Philibert received them, they had thus been *floating* along with the course of the river.

* *Those* who have their possessions in common.

By means of the care and attention of the good cenobite, the two young princes were soon cured of their wounds. Some time afterwards they assumed the monkish habit, resolving to live and die in this friendly solitude. Clovis the Second being apprized of this event, and feeling grateful for the protection afforded to those who had been the victims of a cruel sentence, came to Jumièges, accompanied by his queen Bathilde. He saw and embraced his children once more, and richly endowed the abbey which was henceforward to serve them as a retreat.

Many centuries have passed away since that time; many princes, many noble lords have visited Jumièges, before and since the time of Charles the Seventh, who came to rest from the toils of war near the simple and modest dwelling of Agnes Sorel; the ruins of which are still seen at a short distance from the abbey. Many abbots have succeeded St. Philibert in his office; the neighbouring population have often come to assist in the sacred duties performed beneath the bold arches of that church, brought thither by the renown of superior sanctity which the convent had enjoyed. But now Jumièges is wasted and desolate. Revolutions, rather than ages, have despoiled this magnificent structure. The roof has covered with its ruins the bases of columns, which have no longer anything to support. The modern "Goths" have thrown into a lime-kiln, or sold to antiquarian collectors, the greater part of those wonders of sculpture and masterpieces of art, which formerly decorated Jumièges. Birds alone people these ruins; grass grows in the spacious halls, and in the church. Nothing remains but solitude, desolation, and the two high towers; which would doubtless have been thrown down also, for the sale of their stones, if they did not serve as guides to the mariners in ascending the river; but, if you should visit Jumièges, in the midst of all this desolation, not far from the monument where Agnes Sorel's heart was deposited, they will still show you half hidden by briars and rubbish, the tomb of the two ENERVÉS.

THE *bodily* eye is capable of perceiving *natural* objects, and of thereby conveying to the mind a continual accession of ideas; but how could it perform this office unless there were *light* to render these objects visible? The *mental* eye, in like manner, is capable of discerning *spiritual* truths; but to what purpose would it possess this faculty, unless these truths were rendered discernible, by a sufficiency of light to bring them to its view; and whence can that light issue, but from the source of spiritual illumination? In both cases, the natural objects and the spiritual truths have, indeed, their existence, independently of our perception of them; but except so far as the natural light in the one case, and the light of revelation in the other, is cast upon them, they are to us as if they did not exist. As well, therefore, might we affirm that the eye can see in darkness, as that reason can discover spiritual truths without the light of *revelation*.——VAN MILDERT.

THROUGH groves sequestered, dark, and still,
Low vales and mossy cells among,
In silent paths the careless rill
With languid murmur steals along:
Awhile it plays with circling sweep,
And lingering, leaves its native plain;
Then pours impetuous down the steep,
And mingles with the boundless main.
Oh! let my years thus devious glide,
Through silent scenes obscurely calm,
Nor wealth, nor strife, pollute the tide,
Nor honour's sanguinary palm:
When labour tires and pleasure palls,
Still let the stream untroubled be;
As down the steep of age it falls,
And mingles with Eternity!—HAWKESWORTH.

ON THE CUSTOM OF WEARING RINGS.

I. Finger-Rings.

The wearing of rings upon the fingers is a custom which has prevailed among nearly all the most distinguished nations of the world, from the earliest days of history to our own times. The origin of the practice is, in fact, shrouded in the darkness of antiquity; but, whenever it arose, and wherever entertained, it implied a title, or presumption, on the part of the wearer, to honour and respect.

Like most of the primeval tokens of the vanity of mankind, the custom certainly arose in the East, and spread itself over the world with the increasing numbers of the human race. In ancient Egypt, the kingdom of the Pharaohs, the use of seals existed at least 1700 years B.C. When Joseph was advanced to the dignity of chief governor under Pharaoh, he received from the monarch his ring, as a token of the authority with which he was invested over the people of Egypt. In the kingdom of Persia, we find in the Book of Esther, that the monarch, Ahasuerus, when he raised his favourite Haman to authority and power, gave him his ring; as likewise he did afterwards to Mordecai. In the beautiful parable of the Prodigal Son, we find that one of the marks of his restoration to his home and family, and the favour of his sire, is that the latter commands his servants to "put a ring on his hand." The Apostle St. James, likewise, when reproving the early Christians for their faults, blames them for showing undue respect to those who were rich—for instance, "a man with a gold ring."

We read likewise in the Book of Numbers, c. xxxi. v. 50, that, when the Israelites had conquered the Midianites, who dwelt at the southern part of Palestine, they offered to the Lord among other things the rings which they had taken from the enemy. This circumstance shows, therefore, that in those early ages, the practice was very common. It was, probably, universal in Egypt, which was intimately connected, in very ancient times, with all the western part of the Asiatic continent. Indeed, rings are among the articles discovered by Belzoni and others, as the remnants of Egyptian antiquities in the chambers of the Pyramids.

When the ring was used as a mark of government or authority, for the purpose of sealing or authenticating public or private documents, it was termed a *signet*-ring, or signet; which occurs frequently in the Scriptures and in other writings: the seal being then, of course, worn on the hand, as is sometimes the case even in modern times. Sometimes, however, it was worn as a bracelet on the arm, a custom which still obtains in the East. Thus the bride in the Canticles, c. viii. v. 6, desires that her spouse would wear her as a *seal* on his arm.

We do not find much mention of the ring with reference to the countries properly comprehended under Ancient Greece; but, in the personal history of the Roman nation, the ring forms a very distinguishing ornament in the way of dress. They began to be common at Rome after the expulsion of the kings, though they were anciently in use among the Sabine part of the population of Italy. Gold always was, as it is now, the metal most chiefly used for making rings; but iron, lead, copper, and silver, were all first used by the lower order of people, gold being reserved for the senators and knights. The plebeians used sometimes rings gilt or plated; at other times, they were made of amber and ivory.

Iron rings were permitted to slaves who wished to gratify their taste for ornament. In the course of time, diamonds and other precious stones were fixed upon the rings; and the make of the rings was more tasteful and elegant. When slaves were enfranchised, they were allowed to wear rings of a more noble metal than iron: so that the change of the ring was an outward and visible sign of elevation in the social state. At one time of the Roman republic, the distinction of rings for the several orders of the state, was strictly preserved. At the battle of Cannæ, Hannibal collected several bushels of gold rings, belonging to the conquered Romans, thus showing that, though the *gold* ring was once confined to the senators, its use had become general in the army. Though the slaves could not presume to wear gold rings, yet they ventured to wear iron ornaments of this sort, richly gilt.

Soon after the erection of the Roman state into an empire, gold rings were worn almost universally, except by slaves. In order, therefore, to bring back the dignity of the ring to something like its former state, a law was passed, under the sanction of Tiberius Cæsar, to restrict the wearing of the gold ring to persons whose immediate ancestors were possessed of property to a certain amount: but, in the time of Justinian, all who had not been slaves, were permitted, by an universal decree, to enjoy the pleasure or honour of wearing the gold ring.

The Romans, who seem to have distinguished themselves above all other people in the wearing of rings, became at length so delicate and fastidious, that each person commonly had two rings, one thick and heavy for the winter, and a lighter one for the summer. By moderate people one ring was worn on the middle finger. In the course of time the number of rings worn by each individual was increased: three rings on one hand soon became common, and soon after, one on each finger. One man, we are told, wore *sixteen* on his hand. At one time they used the right-hand, at another time the left, then all the fingers in turn; at last the fingers of the *left*-hand were entirely covered with jewelled rings, it being found that the right-hand was inconvenient for the purpose.

The face of an ancestor, of a friend, or of the reigning emperor, was sometimes sculptured on the rings, and at other times some public event, such as a victory, or a triumph: such a ring was commonly employed in the sealing of letters. Under the sculpture of the stone was often concealed a deadly poison, that the wearer of the ring might, by this suicidal method, free himself from the frowns of fortune. This sad and dreadful alternative was chiefly had recourse to under despotic rulers, and in the declining ages of the Roman empire. The cases of Demosthenes and Hannibal are well known.

When a person was dying, the ring was taken from his finger. If the dying person delivered it to any one, it betokened the adoption of the person to whom it was delivered, as heir to him who gave it. Sometimes the dying parent delivered it to the eldest son, in token of the dominion of the latter over the family estate. The birth-day ring was only worn on that day, and was a present from friends.

The ornaments of the ancient Britons, like those of the Gauls, consisted in part of rings, made of gold and silver, and in default of these metals, of brass. They were exceedingly fond of these ornaments, and had them of iron, when nothing better was at hand. On opening some of the barrows or burying-places of the ancient Britons, which are so numerously scattered over the downs of South Wiltshire, Sir Richard Colt Hoare found numerous rings and female ornaments, so elegant and so rich as to make it evident that the ancient Britons were not so barbarous as we generally imagine; for they must have had a foreign

commerce to enrich them, especially with gold; so that they either imported expensive works of art from abroad, or paid for the production of them at home.

The antiquity of the marriage-ring is, in all probability, very great. It was a pledge of an engagement solemnly contracted, and of never-ending unity and affection. Its use as a pledge was at one time more regarded than its value as an ornament, therefore it was made of *iron*. In the course of time, the iron gave way to gold; but women were still not in the habit of wearing rings in the early times of the Christian Church, except such as their suitors sent them. The nuns of the order of St Anne, at Rome, show a rude silver ring as the wedding-ring of Joachim and Anna, the parents of the Virgin Mary.

We cannot conclude this part of our subject without noticing an ancient form of the marriage-ring, termed the *gimmal* ring. The origin of the word "gimmal" is to be referred, perhaps, to the Latin *gemellus*, *twin* or *double*, and implies the *unity* of heart which should belong to the married *pair*. The ring is constructed, therefore, of double hoops, which play one within another, like the links of a chain. Each hoop has one of its sides flat, the other convex; each is twisted once round, and each is surmounted by a hand, issuing from an embossed fancy-work wrist or sleeve, the hand rising somewhat above the circle, and extending in the same direction. The course of the twist in each hoop is made to correspond with that of its counterpart; so that, on bringing together the flat surfaces of the hoops, the latter immediately unite in one ring. On the lower hand, or that of which the palm is uppermost, is represented a heart; and, as the hoops close, the hands slide into contact, forming, with their ornamented wrists, a head to the whole. The device thus presents a triple emblem of love, fidelity, and union. Such a ring as this was found at Horsleydown, and exhibited in the year 1800, before the Society of Antiquaries.

When the gimmal-ring was used as the ring of affiance, the lover putting his finger through one of the hoops, and his mistress her's through the other, were thus, symbolically, yoked together; a yoke which neither could be said *wholly* to wear, one half being allotted to the other. In this use of the gimmal may be seen typified, "a community of interests, mutual forbearance, and a participation of authority."

There is a superstition common in the west of England, among ignorant people, that a person subject to fits may be cured by wearing a ring made of the lead of a coffin which has remained a certain number of years in the vault. The writer has frequently had occasion to employ a poor man, subject to fits, who wore upon his fingers as many as seven or eight rings of the above description. He declared his entire belief in the efficacy of the remedy, the successful operation of which he had witnessed in cases similar to his own; and he feared that the reason why he himself was not cured was because he had not got the proper description of lead, or that it was not taken from the coffin at the proper time.

O SACRED *Solitude*, divine retreat;
Choice of the prudent, envy of the great;
By thy pure stream, or in thy waving shade,
We court fair Wisdom, that celestial maid:
The genuine offspring of her loved embrace,
Strangers on earth, are innocence and peace.
There, from the ways of men laid safe ashore,
We smile to hear the distant tempest roar;
There blest with health, with business unperplexed,
This life we relish, and ensure the next.—YOUNG.

THE ORDER OF KNIGHTS OF THE BATH.

II.

IN a former article on this subject, we briefly sketched the history of the order to the beginning of the present century, and described the ceremony of investiture. On the 19th of May, 1803, an installation of twenty-two knights, attended by sixty esquires, was held.

When George the First revived the order, he appointed Henry the Seventh's chapel for the performance of the ceremony of installation: and accordingly, on the occasion to which we allude, all the requisite preparations were made in the chapel.

The knights-elect, dressed in their surcoats, mantles, and spurs, assembled in the Prince's chamber at Westminster, at ten o'clock in the forenoon; where the knights companions, in their full orders, met them at half-past ten. They then, with the dean at their head, went in procession from the Prince's chamber, to the south-east door of Westminster abbey, along a platform wide enough to admit six persons abreast. This platform was lined with guards, outside of whom were immense throngs of spectators. The Duke of York, as Grand Master of the Order of the Bath, walked last in the procession. A band of trumpets and drums played the air, "Britons strike home."

The procession entered the abbey in the following order:—

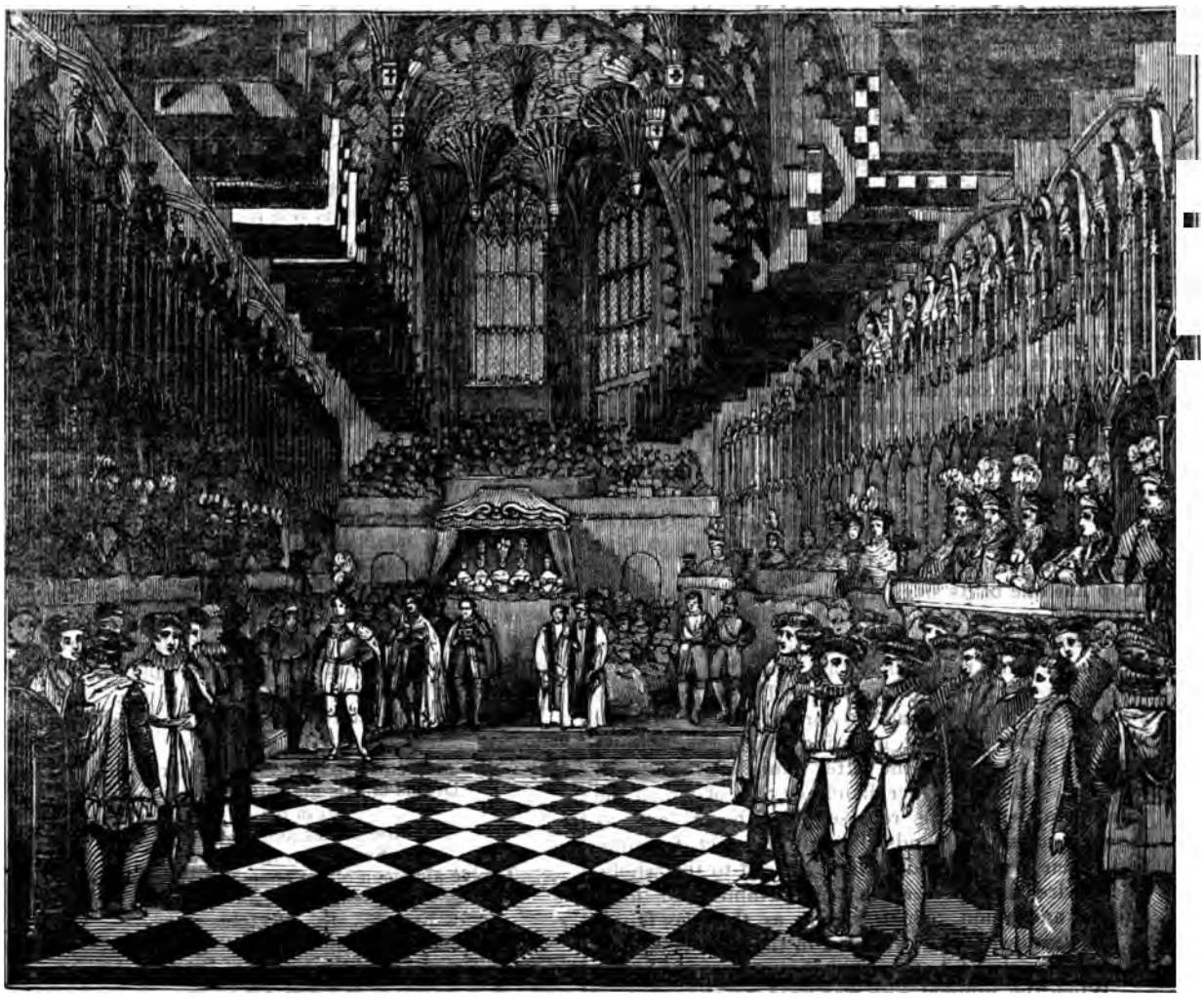
Six gentlemen in dark crimson silk scarfs.
Drums of His Majesty's household.
Drum major.
Kettle drums and trumpets.
Serjeant trumpeter.
Twelve almsmen of the church of Westminster.
Messenger of the Order.
Esquires of the Knights-elect.
Esquires of the Knights Companions.
Prebendaries of the church of Westminster.
The Sub-dean.
Officers at arms.
The Knights-elect.
Officers of the Order.
Dean of the Order.
Duke of York, as Grand Master.
Twelve Yeomen.

The procession passed down to the end of the south aisle, where were seated the Queen, the Princess of Wales, the Princesses Augusta, Elizabeth, Mary, Sophia, and Amelia, and the Duke of Cumberland, in a box lined with crimson velvet. The knights halted, and paid their obedience to the royal visitors; and then proceeded onward to Henry the Seventh's chapel; where, all being entered, the doors were closed, and no one admitted as a spectator of the installation.

All the various officers then made a double reverence:—*i. e.*, first to the altar, and then to the tomb of Henry the Seventh, and passed on to the places assigned to them. All the knights, both elect and companions, stationed themselves under their respective banners. The King at Arms then bowed to the Duke of York and all the knights companions, who thereupon ascended their stalls, and sat down covered.

The next ceremony was to bury under the altar, the banners of the knights companions, who had died since the last preceding installation. The two junior knights companions received from the King at Arms, the banner of the senior deceased knight, and carried it towards the altar, where they placed it into the hands of the prebendaries. The same ceremony was performed with the banners of all the other deceased knights.

This singular kind of burial of the honours of



INSTALLATION OF KNIGHTS OF THE BATH, IN WESTMINSTER ABBEY.

deceased knights, being ended, the new knights were next installed, one at a time, in the following manner: the senior knight-elect came forward to the middle of the choir, made his reverences, and ascended his stall, where he stood with his hat and feather in his hand. The book of the statutes and the great collar of the order, were then brought on a cushion to the middle of the choir. The Duke of York descended from his stall, and, attended by the dean, proceeded to the stall of the knight-elect. The Duke then took the book of the statutes, and delivered it to the knight-elect, to whom the dean administered an oath. The Duke as Grand Master, then took the collar, and invested the knight with it: lastly, he placed the hat and feather on the head of the knight, and caused him to take his seat,—which constituted the act of installation. The remaining knights-elect, were installed in a similar manner.

Divine service was then performed, consisting of a Te Deum, and several anthems, performed by the organist and choir, the knights being uncovered. When the service was ended, the knights put on their hats and feathers, descended from their stalls, made their reverences in the middle of the choir, and retired under their respective banners. The Grand Master, and all the other knights in succession, then proceeded to the altar, on which they laid oblations of gold and silver. After which, all the knights proceeded again to the altar, according to seniority, drew their swords, and handed them to the dean, who laid the swords on the altar, and afterwards returned them to the knights. The knights, after being conducted back to their banners, remained there during the performance of the coronation anthem, which concluded the ceremony.

The procession then returned to the Prince's chamber, in the House of Lords, in nearly the same order as before.

On the procession arriving at the door in Poet's corner, the King's cook, dressed in full court dress, bowed to each knight, and addressed him thus:—"Sir knight, the great oath that you have taken, if you keep, it will be great honour to you; but if you break it, I have power, by virtue of my office, to hack the spurs from off your heels." Each of the knights bowed to him and touched his hat. Some of them asked him if there were any fees to pay? to which he answered, he would do himself the honour to call on them. Four guineas is said to be the fee for this extraordinary speech.

Among the knights installed on this occasion, were Lord Nelson, Lord Whitworth, Lord Keith, Sir Joseph Banks, Lord Henley, Admiral Saumarez, Admiral Duckworth, &c. Of the twenty-two knights, eleven were at the time abroad; so their places were supplied by proxy.

It will be seen, from these details, and from our wood-cut illustration, that the installation of Knights of the Bath, was a very splendid ceremony. Indeed, with the exception of the coronation, there are few which have exceeded it in magnificence.

All the information which we have given, in this and the former article, respecting the nature of this order, must be considered as applying before the

year 1815, since great changes were made at that time.

After the momentous wars, in which England had been engaged from 1790 to 1815, the Prince Regent was desirous of distinguishing, by some honorary title, those officers who had deserved well of their country during the war; and he therefore, made such changes in the constitution of the Order of the Bath, as should allow of a great increase of its numbers. He therefore ordained that the order should consist of three classes, differing from one another in rank and dignity, viz., Knights Grand Crosses, Knights Commanders, and Companions.

The first class, were to be on a level with the Knights Commanders previously made. They were, with the exception of princes of the blood royal, not to exceed seventy-two in number; of whom, a number not exceeding twelve, might be nominated in consideration of services rendered in civil and diplomatic employments; but the remainder were to be officers in the army or navy. The officers then newly created into this class, were to bear upon the ensign or star, and likewise upon the badge of the order, the addition of a wreath of laurel encircling the motto, and issuing from an escroll inscribed "*Ich dien**." The lowest rank in the army to which admission to this class was to be awarded, was fixed at major-general, and in the navy, rear-admiral.

Of the second class, the number, in the first instance, was not to exceed one hundred and eighty, exclusive of foreign officers holding British commissions, of whom, a number not exceeding ten, may be admitted into this class as honorary knights commanders; but, under particular circumstances, the number composing this class may be increased. The officers chosen into this class, must be holding a commission at the time; and at the period when these changes were made, a lieutenant-colonelcy in the army, or a post-command in the navy, was the lowest rank admissible into the class; but, by a subsequent arrangement, no officers under a major-general, or a rear-admiral, are admitted. Each knight commander to wear his appropriate badge or cognizance pendent by a red riband round the neck, and his appropriate star embroidered on the left side of his upper vestment. For the greater honour of this class, it was further ordained, that no officer of His Majesty's army or navy, was thenceforward to be nominated to the dignity of a knight grand cross, who had not been appointed previously, a knight commander.

The third class, or Companions, was to be composed of officers holding commissions in His Majesty's service, by sea or land; not to be entitled to the appellation, style, or precedence, of knights bachelors; but to take precedence of all esquires of the United Kingdom. No officer to be nominated a companion of the order unless he shall previously have received a medal, or other badge of honour, or shall have been specially mentioned, by name, in despatches published in the *London Gazette*, as having distinguished himself.

Shortly afterwards, the second and third classes of the order were placed open to the reception of a certain number of officers, in the service of the East India Company, as a testimony of the value which was placed upon their services.

It will be obvious, that since the order is so completely remodelled, and so greatly extended, the splendid scene of an installation, cannot reasonably be expected to be repeated, on a scale of magnificence such as we have attempted to describe.

* *Signifying in the German language,* "I serve."

THE WATER-LILIES OF THE NILE.

WHEN the Nile is at its height (says Herodotus) and the fields are covered with its waters, there appears on the surface a vast quantity of lilies, which the Egyptians call *lotus*; these they gather and dry in the sun, carefully preserving the seed. This seed resembles that of the poppy, and is found in the middle of the lotus; they bruise it and make bread of it. They also eat the root of this plant, which has a sweet and pleasant taste; it is round, and about the size of an apple.

Indeed, from the time that the Nile begins to overflow its banks, and to spread over the adjacent country, until the return of its waters to their natural channel, the surface of canals, rivers, and of almost all the inundated soil, is enamelled with flowers. Their splendid corollas, some white and others azure, delight the senses by their soft perfume, and beautiful appearance. These flowers are those of two sorts of water-lily, (*Nymphæa,*) which are peculiar to Egypt. The first, which Linnæus calls *Nymphæa lotus*, has long been celebrated by historians and poets; and all travellers both ancient and modern have bestowed on it their tribute of praise and admiration. Its root consists of a bundle of very long white fleshy filaments, the upper ends of which proceed from roundish tubercles. These tubercles are the part of the root which Herodotus speaks of as affording food to the people, but the flavour is not such as he describes it to be: on the contrary we find it dry, earthy, and insipid. The leaves of this plant are large, numerous, and divided into two lobes from their base up to the place where the leafstalk is inserted, that is to say, to the middle of the disk; they are not so thick as those of our water-lilies of Europe, of a deep green colour, the upper surface shining, the under one often clouded with violet or purple. These leaves are borne by cylindrical stalks which spring from the root, and are of considerable length, floating on the surface of the water.

The flowers are of a very large size, often measuring more than four inches in diameter; the flower-stalks also rise from the root and bear each one blossom. The calyx or flower-cup is composed of eight leaflets, disposed in two rows and coloured within; those of the innermost row are the most deeply coloured, and somewhat resemble the petals. The petals are from twelve to twenty in number, and equally disposed in many rows. They are oval shaped, lanceolate, and very unequal; those of the last row being much smaller than the others; their colour is pure milk white; sometimes, but not ordinarily, tinged with purple. The stamens are yellow, with wide petal-shaped filaments.

The second kind of water-lily common to Egypt, and which has been termed on account of its blue colour *Nymphæa cærulea*, does not appear to have been much noticed by travellers, though it always grows by the side of the *Nymphæa lotus* and seems to take pleasure in mingling its blossoms with those of that beautiful plant. The difference in the growth and form of these lilies is not considerable: their fruit is likewise the same: in both species it is a dry round grain divided into many cells which contain a quantity of small rose-coloured seeds. The odour which is exhaled by this azure lily is extremely delicate and sweet; that of the lotus is more powerful but much less pleasing.

We have two sorts of water-lily common in England; the white and the yellow; our white lily (*Nymphæa alba*), which opens its petals at about seven in the morning, and closes them at about four, reposes on the surface of our slow-running rivers and brooks in almost Oriental magnificence. Many of the British

water-plants are extremely beautiful; but there are none more to be admired than the white and the yellow water-lilies. The latter of these is chiefly found in lakes or pools.

Some of the plants which float on our rivulets or adorn their banks are thus noticed by Mrs. Charlotte Smith.

Sheltering the coot's or wild duck's nest
And where the timid halcyon hides,
The Willow-herb in crimson dressed
Waves with Arundo o'er the tides;
And these the bright Nymphæa loves to lave,
Or spread her golden orbs upon the dimpling wave.

THE CIRCULATION OF THE BLOOD.

That the blood passes from the heart to the several parts of the body was discovered about 1620, by Harvey. The heart is a powerful muscle, which, by its action, contracting and dilating, sends forward the blood with extraordinary speed to all the extremities of the body. The vessels which receive it from the heart, and convey it to its destination, are called arteries; if one of these be opened, the blood spouts from it in jets caused by the several contractions of the heart. You may feel the blood bounding along by placing your finger on a pulse; wherever there is a pulse, there is an artery. You may perceive a pulse in the wrist, in the neck, in the temple, and under the lower jaw.

The arteries which are nearest to the heart are very large; as they are more distant they divide into branches, so that altogether they would appear like trees, with a great trunk and small branches. After the arteries have carried the blood to the feet, the hands, the head, the whole surface and substance of the body, the business of the veins is to bring it back again. They receive it from the arteries and convey it to the heart; and, being small at the extremities, they unite their streams like rivers, and finally flow back to the heart in a large and copious current. They have very curious valves, or internal flaps or caps, which allow the blood to come from the extremities towards the heart, but should any circumstance incline the blood to go back to the extremities, the valves close like doors, and prevent it. Sometimes these valves are out of order, and the veins then can scarcely perform their office. The blood which returns from the feet to the heart has a long way to travel, and the valves prevent the blood in the higher parts of the veins from pressing on the lower part, but if the valves cannot close, these veins in the leg suffer by it, and swell, and sometimes burst.

You may perceive by this account that there is a continual exchange of blood that fills the heart; it is no sooner emptied into the arteries than it is filled again from the veins, and this contraction and dilatation succeed each other with great rapidity. It is supposed that the quantity of blood contained in the body amounts to between twenty-five and thirty-five pounds, and that about two ounces pass on from the heart at each pulsation. Hence the whole quantity of blood will pass through the circulation in three or four minutes. Dr. Hunter dissected a whale, and he related that the aorta, which is the principal artery of the body, measured a foot in diameter, and that ten or fifteen gallons of blood are thrown out of the heart at a stroke.

The lungs are very largely supplied with blood-vessels, of which some appear to be destined for the nourishment of the lungs, but by far the principal part convey the blood from the right side of the heart, in order that it may, after minute division and diffusion over the air-cells, be exposed to the influence of the external air, drawn in by breathing, and be carried back to the heart in a proper state for nourishing the body. The blood which passes from the heart into the lungs is of a dark red colour; after circulating through the lungs, it becomes of a florid red, and is then in a state fit for nutrition. It has been supposed by men learned in these subjects, that part of the oxygen which exists in the air is absorbed by the blood in the act of breathing, and gives it this florid red colour.

If you would convince a person of his mistake, accost him not upon that subject when his spirit is ruffled or discomposed with any occurrences of life; and especially when he has heated his passions in the defence of a contrary opinion.
Watts.

PHILOSOPHY OF A SOAP-BUBBLE.

IV.

At the conclusion of the last paper*, we explained the manner in which the coloured stripes of the soap-bubble are formed in white light, and illustrated it, by supposing seven pieces of properly painted glass, to be superposed. This mode, however, would be practically impossible, owing to the imperfection of our artificial colours, the comparative opacity of coloured glass, and other causes. Seven pieces of glass, properly painted like the seven prismatic colours, and superposed, do not form white, but black; and, therefore, we could only expect a similar result with the pieces described in the last paper.

There is, however, another mode, probably well known to the reader, by which a colour approaching to white, is formed by the mixture of the seven simple colours. We mean, a painted circular card, which is made to revolve very quickly. In this case, by properly adjusting the quantity of each colour, *white* light is formed by the mixture, when rapidly revolved. It now only remains to explain, how the alternately light and dark rings, spoken of before, are formed by homogenous light; and the colours of soap-bubbles and other thin plates, will then be entirely explained. For this purpose, we must enter a little into the two principal theories of the nature of light.

Newtonian Theory. Newton supposed light to be a species of matter, consisting of exceedingly small, imponderable, or *weightless*, corpuscles, or little bodies, projected by the sun into space, in all directions, and moving with a velocity of about 192,000 of English miles in a second of time.

Now to account for the phenomena of thin plates, he supposed that every *corpuscle*, or atom of light, as it moves through space, is subject to alternate *fits*, called *fits of easy reflection* and *transmission*. If a particle of light reach a surface during a fit of reflection, it will easily yield to the reflecting force of that surface, and be reflected. But, if it be in a fit of transmission, it will overcome that force which tries to make it bound off, and will pass on, or be transmitted.

Now, let a beam of light, consisting of rays all of one kind and colour, meet the first surface of a very thin plate of any transparent substance; all those rays which are in their fits of reflection, will be reflected, and so need not be taken into account: but those which are in a fit of transmission, will pass on into the plate; and after a short time will reach the second surface. Now, whether they are reflected back at this surface, or whether they pass on out of the plate, depends on the thickness of the plate. They must all have been in their fits of transmission when they entered the plate, or they could not have entered it at all. If, therefore, the thickness of the plate be *less than half the length of a fit*, they will still be in the same fit as when they entered, and will, therefore, be transmitted at this second surface; not a ray will be reflected: the plate will look black from above, but white from below. This accounts for all plates below a certain thickness presenting this appearance.

But, suppose the thickness of the plate to be as much, or nearly as much, as the length of a fit, then, all the rays which entered the first surface in a fit of transmission, will, during their passage through the plate, have changed their fit; and when they arrive at the second surface, they will be in a fit of reflection, and will all be reflected; and the film will look white, as in the first arch of the soap-bubble, or the innermost ring between the lenses. But, if the thickness of

* See Saturday Magazine, Vol. XV., p. 225.

the film be a little more increased, then the ray will not reach the second surface till it has entirely passed through this fit of reflection, and begun another fit of transmission; so that then, the film will again appear black; for all the rays will be transmitted. In the same manner, it will be seen that if the thickness of of the plate be $\frac{1}{2}$, $1\frac{1}{2}$, $2\frac{1}{2}$, $3\frac{1}{2}$ fits, it will transmit all the light, but if its thickness be equal to the length of 1, 2, 3, 4, or any whole number of fits, it will reflect all the rays and transmit none.

This applies, however, only to light of one colour. To account for the different breadths of the rings, when seen by different kinds of homogeneous light, Newton supposed the fits of red light were longer than those of violet light; and that the differences of colour and refrangibility in different kinds of rays, weresolely owing to the different lengths of their fits; red having the longest, and violet the shortest fits. Of course, this would occasion a difference in the thickness of plate required to reflect the different colours, thus accounting for the different breadths of the stripes of different colours, and also for the peculiar appearance presented when white light, or a mixture of all the colours, is used.

Newton even calculated the length of the fits of each kind of coloured light, which of course he could find, by measuring the thickness of his plate of air at different places; but how was this to be done, when its thickness was less than that of the thinnest gold leaf, of which 200,000 pieces would hardly be an inch in thickness? If the reader has some little knowledge of the beautiful science of mathematics, he will be prepared to understand the explanation of the manner, in which Newton measured these thicknesses in millionths of an inch*.

Newton determined the thickness of the black part of a soap-bubble to be only three-eighths of a millionth of an inch. This was one in addition to those similar, but more gigantic, calculations, by which he proved the earth, and other planets, to be moved by the same force, which made the apple fall from its native branch to the ground.

We will now give a slight idea of the mode by which these phenomena are accounted for by the present much more probable theory of light,—the *undulatory theory*.

According to this theory, light is not a peculiar substance or *kind* of matter, but only a peculiar *state* of matter; viz., a state of vibration like that which produces sound. The vibrations of sound are communicated through the air; but those of light through a far more rare and subtle fluid called *ether*, which is supposed to fill all space, and to be so extremely subtle as to penetrate not only between the particles of air, but also between those of solid substances, passing through glass as easily as water through a net. What is generally called a *perfect vacuum*, must therefore be only a space filled with this ether; for, of course, no vessel could be made which would confine or exclude it. The excessive thinness of this fluid accounts for its undulations being communicated with immense rapidity. It is supposed that every source of light sets this ether into a vibrating or wavering state; as a vibrating string acts on the air, or a stone on the water into which it is thrown.

Now it is known that, if two tides, or sets of waves, meet each other, the result is sometimes a very high tide, but sometimes no tide at all. If the two sets of waves meet in such a way, that all the elevations or waves correspond, and all the depressions or troughs also correspond, the result is a doubly high tide, as might be expected. This is the case in many harbours where the tide comes by two passages of equal length. But suppose the passages to be rather unequal in length, so that one tide arrives a little later than the other, the difference may be such, that all the elevations of one set of waves correspond with the depressions of the other, and *vice versâ*. Then the two tides destroy each other, and render the surface of the water comparatively smooth.

The same thing occurs in sound; sometimes *double sound produces silence*. When two notes slightly differing from each other in pitch, are sounded together, the two sets of waves meet as above, and sometimes destroy each other. Thus, the two notes instead of uniting and producing a louder sound, produce that periodical interval of silence which the musician calls a *beat*.

According to the undulatory theory, the same occurs with light. Sometimes *double light produces darkness*. When two portions of light arrive at the same spot by travelling two different routes, if the two routes slightly differ in length, the two sets of ethereal undulations may so meet as to destroy each other, as the two tides do in some harbours; and such is the case in those very thin films which appear black. The light falling on them follows two different routes, in order to come to the eye. Some light is reflected back from the first surface, and the rest penetrates into the film and is reflected from the second surface; and this last portion evidently travels to the eye by a route rather longer than that of the former portion. Now, if the thickness of the plate be equal to half the length of a wave of light, or to the length of $1\frac{1}{2}$, $2\frac{1}{2}$, $3\frac{1}{2}$, &c. waves, the two sets of undulations coming from the two surfaces of the film, and meeting in the eye, destroy each other, and produce darkness, or a black colour. This is the case in all the black stripes, which appear on a thin film seen in homogeneous light. But, at all the light stripes, the thickness of the plate is 1, 2, 3, 4, or some whole number of light waves; and at such places, the two portions of light from the two surfaces, on uniting in the eye, produce a doubly luminous effect.

As in the Newtonian theory of light, the fits are of different lengths in the different colours, so, in this theory, different colours in light are like the different notes in musical sounds: they are both due to a difference in the length or slowness of the vibrations; in the one case of ether, in the other of air. *Brilliancy* of light corresponds with *loudness* of sound; but *colour* corresponds with *pitch*. Some persons are inclined to doubt the accounts of the rapidity of the vibrations requisite to produce *sound*; the very lowest sound being due to at least twelve vibrations in a second of time, while the highest notes require 3000 or 4000 vibrations in a second! But what will such persons say to the velocity of the vibrations which constitute *light*; when it is calculated, on unerring principles, that to produce red light, which corresponds to a low sound, there is required about 458 billions* of vibrations in a single second; while violet, or the light which corresponds to a shrill sound, is due to 727 billions of vibrations in a second of time! This difference in the length of the waves of the different colours, accounts for the different breadths of the stripes seen on a film in different *coloured* lights; and for the different coloured stripes seen in *white* light, as explained at the end of the last paper.

* A billion is a million of millions.

* *See* TOMLINSON'S *Manual of Natural Philosophy*, p. 538.

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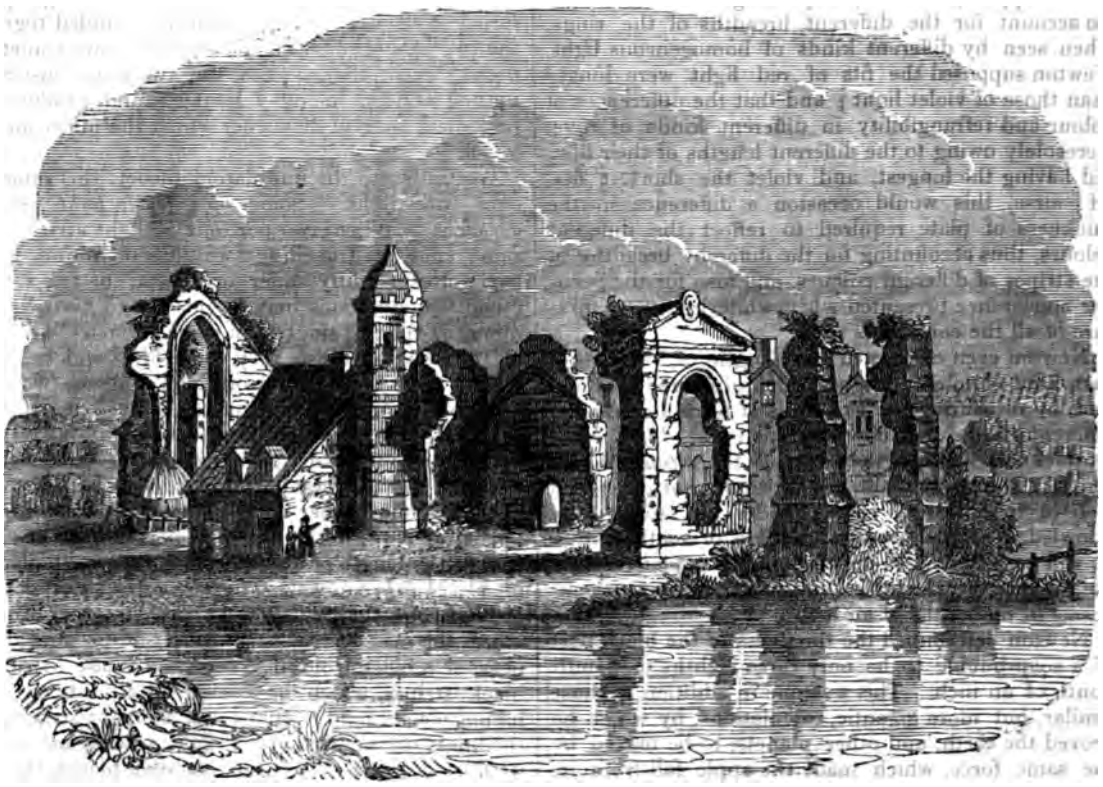


RUINS OF DUDLEY PRIORY.

Dudley is situated on the confines of Worcestershire and Staffordshire, part of it being in each county: it may therefore be said to be in either; but we believe it is generally reckoned among the towns of Worcestershire.

The name is supposed to have originated from *Dodo*, a famous Saxon, who raised the first fortification, on the site of the present ruinous *Castle*, standing on a hill above the town. This castle, and the manor belonging to it, obtained the name of *Dudelie*, and was possessed in succession by Earl Edwin, William Fitz Ausculf, and the family of the Paganells. It continued to be occupied as a manor-house during several reigns; until at length, in the 46th of Henry the Third, Roger de Somery, the then holder of the manor, was permitted by the king to build a castle on the hill, the remains of which are still to be seen. The castle passed through several generations of the *Somerys*, then to the *Sutton* family, and afterwards to that of *Ward*, the ancestors of the present Earl of Dudley. The castle was considered as a military fortress till the time of the Commonwealth. During the troubles of Charles the First, Dudley castle held out gallantly in the royal cause, under the command of Lieutenant Colonel Beaumont, for three weeks, until, on the 11th of June, 1644, the royal forces, sent from Worcester, relieved it. The besiegers left one hundred men dead on the field; and two majors of foot, two captains, three lieutenants, and fifty common soldiers, were taken prisoners. After the Restoration, the castle was dismantled and sold.

Viewed from a distance, the situation and effect of the ruins of the castle are very striking: situated on the summit of a hill, commanding the town and valley beneath, and a prospect over seven English and two Welsh counties, including eighteen churches, many large towns, and a tract of country intersected by lofty ranges of hills, and diversified by the abodes of wealth and elegance. On a near approach, however, much of the effect is lost; for there is nothing to soften down the harshness of the outline of the bare walls, rather incongruously associated with modern buildings, whose deficiency in the picturesque destroy every idea of sombre grandeur that might arise in the mind. This want of wood has been often regretted, particularly as the hill was once well covered; but it is, perhaps, not a cause for much surprise, considering that the castle itself has been long uninhabitable, and is situated in the immediate vicinity of a manufacturing town.

The castle was once very extensive, occupying an acre of ground; and though begun in the eighth century, consists now of dilapidated fragments of different styles of architecture, among which the *keep* stands pre-eminent, owing to its great original strength. In this part of the castle was the *chapel*, of which two windows, rich in tracery, still remain; and here may also the vestiges of the dungeon be seen. While the

castle was lying desolate and dismantled, in the beginning of the last century, a gang of coiners took up their abode within its dreary ruins, where they carried on their nefarious trade for a considerable time, eluding suspicion by terrifying those who might be prompted by curiosity to visit the place, which they effected by imposing on the credulity and superstition of their neighbours, with strange noises, alarming appearances, and all the machinery which constitutes a "good old" ghost story, or a "haunted castle." From this occupation, however, they were expelled by a fire, in 1750, which rendered desolation still more desolate.

We pass now from the Castle to the *Priory*. Gervase Paganel, in 1161, founded on the site of St. James's Church, in pursuance of the intention of his father, Ralph Paganel, a priory of Benedictine monks, of the order of Clugni, dedicated to St. James. In 1190, Pope Lucius confirmed the monks in their privileges and possessions: among the former was one, that in case of a general interdiction of the kingdom, the monks of that priory might privately, their doors being shut, and without sound of bell, perform divine service in a low voice, all interdicted or excommunicated persons being first thrust out: among the possessions confirmed to the monks, were the churches of St. James, St. Edmund, and St. Thomas, in Dudley, and about ten churches and chapels in the neighbouring districts.

In 1300 Pope Boniface granted an indulgence to all who should pray for the soul of Roger de Somery, who was buried here, and had been a benefactor to the priory. In the 13th of Edward the First, the prior had licence to assort and impark a heath in the forest of Kinsare. We do not hear much more of this priory until its dissolution: in 1541, Henry the Eighth granted it, as part of the domain of Wenlock, to Sir John Dudley, and the grant was afterwards confirmed to Edward Sutton, Lord Dudley, by Queen Mary. The yearly value was stated at that time to be 33*l.* 1*s.* 4*d.*

Of the priory itself scarcely the smallest vestige remains at the present day; the only portions of the establishment which have withstood the ravages of time, and the destroying hand of man, being part of the conventual church, whose rich Gothic window, at the east end of the building, and some beautiful moulding in other parts, faintly pourtray its original splendour. On the south side of this window is also a niche and canopy for an image, once richly ornamented. The west end is built with a coarser and redder stone than that used in the other parts of the building; and all the arches appear to have been Gothic. Sampson Erdeswicke, who wrote a *Survey of Staffordshire*, nearly two hundred and fifty years ago, speaks of some monuments that then existed in the priory chapel.

To the east and west of the ruins are large pools of water, apparently the remains of a moat which once encompassed the whole priory. The shattered walls of some of the offices of the priory were some years ago patched up into a dwelling and conveniences for a tanner: afterwards occupied by a manufacturer of thread; and subsequently by other handicraftsmen.

Besides the *Castle* and the *Priory*, the two buildings in Dudley which speak most strongly of times long gone by, are the churches of St. Edmund and St. Thomas. There were evidently churches known by those names in the twelfth century, from the grant which was made by Pope Lucius to the priory, and there appears also in still earlier times to have been a church dedicated to St. James; but no such church has been known there for ages. St. Thomas and St. Edmund's churches were distinct until the civil wars, when they were united, under circumstances which are thus stated in the parish registers:—

Note, that the church of St. Edmund being demolished by Colonel Leveson, in 1646, both parishes did meet in that of St. Thomas, and became as one in all administrations; and so in their offices within a few years afterwards, so that the register book became one also, from thenceforth. On the 16th February, 1646, Mr. John Taylor was settled in the vicarage of Dudley; and had possession given him of the church of St. Thomas, on the 17th of the month. Also the 13th September, 1648, upon the people's petition, it was ordered by the committee for plundered ministers, that both parishes should repair the church of St. Thomas; and by another order they were allowed jointly to meet for divine ordinances therein.

St. Edmund's church was subsequently rebuilt.

There are three charity-schools in Dudley. One was founded about the year 1634, for fifty boys, by Mr. Richard Foley, of Stourbridge; who, recovering some alienated lands, which had been left to charitable uses, and adding something of his own, applied them to this purpose, and built a convenient school-house. Mr. Richard Baxter was the first master. The second school was established for the education of fifty girls. The third is a free grammar-school, endowed with a revenue of 50*l.* a year, by two merchants of London; but this revenue has now reached the value of 300*l.* a year, out of which the master receives 200*l.* A charity was established in 1819, for clothing seven poor men, from a legacy left by the Rev. H. Antrobus, for that purpose. There is also a school of industry, where upwards of two hundred girls are educated; besides one or two other schools.

There are besides the parish churches, places of worship for Methodists, Baptists, Independents, and Quakers. There is an extensive subscription library, which was established about thirty years ago. The mayor and other borough officers are appointed annually by the lord of the manor; but the town itself is within the jurisdiction of the county magistrates. The houses are, generally speaking, well built, and the streets clean, well paved, and lighted with gas. The town, in the very earliest times of the existence of the House of Commons, sent members to Parliament; but that privilege was dropped for many centuries, and not renewed until 1832, when the Reform Bill granted one member to the town. The population of Dudley is now about 24,000.

A good deal of manufacturing industry developes itself in and near the town. There are extensive quarries of limestone in the vicinity; from which a tunnel, a mile and three-quarters in length, has been cut through the hill on which the castle stands, for the conveyance of lime from the quarries to the kilns. There is also a large supply of iron ore in the neighbourhood, the working of which gives employment to many persons; besides about six hundred who are engaged in nail making. Coal also abounds, and gives employment to many hundred miners. Glass is also made at Dudley. There are fairs held on the 8th of May and the 2nd of August, for cattle, cheese, and wool; and another fair on the 5th of August, for lambs. The market-day is on Saturday; and the general position of the town may be understood from its distance from others; it being a hundred and twenty-seven miles nearly north-west from London, twenty-six north-east of Worcester, and nine north-west of Birmingham.

SOMETHING there is more needful than expense;
And something previous e'en to taste—'tis *Sense!*
Good sense—which only is the gift of Heaven;
And, though no science, fairly worth the seven.—POPE.

MATERIALS FOR THE TOILETTE.

No. VII.

On Tooth-Powders and the Management of the Teeth.

Various kinds of paste and powder for the cleansing and preservation of the teeth are found appended to the well-furnished toilette; and the means which seem best adapted to secure to their owner, the prolonged use and comfort of a good set of teeth, are carefully employed by numbers of persons who have learnt to estimate the value of a healthy state of this necessary and wonderful structure.

The gradual developement of the teeth after the period of early infancy, and the change of those teeth in a few years for others that are better suited to the increasing size of the jaw, and to the purposes for which they are required, display the same beautiful adaptation of means to suit the necessities of man, which is everywhere visible in the construction of the human frame. The number of teeth is occasionally found to vary in different individuals, but it seldom exceeds thirty-two, (that is, sixteen in each jaw,) or is less than twenty-eight. Each tooth may be said to have two parts, namely the body, or portion above the gums, and the fang or root, fixed in the socket. The outer covering of the body of the tooth is called the *cortex*, or *enamel*, a very hard substance of a white colour, which is peculiar to the teeth, and which envelopes and protects the bone within. This bone which forms the internal part of the tooth, and the whole of the fang, is harder and more compact than any of the others in the body. There is a cavity within each tooth, which is supplied with blood-vessels and nerves by means of a small hole in the root. Should this hole close, as is sometimes the case in the teeth of old persons, the result is insensibility to pain.

The teeth are usually divided into three classes: *incisors*, or cutters, four teeth in the front of each jaw; *canine*, one on each side of the incisors in each jaw; and *molars* or grinders, ten in each jaw. The last grinder in each side of both the upper and lower jaw is smaller, and arrives later than the rest. Thus it is called the *wisdom-tooth*.

We must not be misled by the common error that *all* dentifrices are injurious and destructive of the enamel of the teeth, that the simple rinsing of the mouth with pure water, or gently rubbing the teeth with a soft brush or with a sponge is all that is necessary to keep them clean and healthy, for a very little observation has been sufficient to prove that in spite of the constant use of these means, a gradual deposition of what is called *tartar* has taken place, and that that great enemy to the beauty, health, and soundness of the teeth has so far established itself on their inner, if not on their outer surfaces, as to defy the power of tooth-brushes and tooth-powders henceforward for its removal. Thus an evil which might have been easily prevented by a little daily attention to the teeth, with the use of proper brushes and some simple powder, has become so confirmed, that either the dentist must be called in to remove by the aid of his instruments the firmly adhering tartar, or some powerful acid must be used, which may probably inflict a lasting injury on the enamel of the teeth, or it must be allowed to accumulate until (besides the unsightly appearance produced) it excites irritation and inflammation of the gums, gradually causes them to withdraw their support, and finally occasions the loosening and dropping out of the teeth before they have become subject to decay, and at an earlier period than according to the course of nature, such an effect could be produced. We do not mean to assert that all persons are equally subject to this evil. In the case of some individuals, the deposition of tartar is not so abundant or so injurious in its effects as in that of others, but wherever it is found, it is the enemy of the teeth, and if neglected will lead to their ultimate loss. There are other sources of injury and decay which it will not concern us here to speak of, but as the removal of tartar is, at its early deposition, within the power of every person, and as it may sometimes increase without the knowledge or observation of those who have but little time to bestow on the duties of the toilette, we proceed to some further notice of this substance, and of the means to be employed in preventing its formation in a concrete state, or, if that be already the case, in effecting its removal.

The tartar of the teeth consists of animal matter, and earthy phosphates. It is held in solution by the saliva, on the evaporation of which it becomes deposited on those parts of the teeth which are protected from the action of the tongue. It varies according to the constitution of the individual and the nature of the food, but the deposition has been observed to be largest in the case of persons who speak much, and thus allow opportunity for a greater evaporation of the saliva than ordinary. At first the tartar is deposited in a soft state, and there is no difficulty whatever in removing it, but in a short time it grows firm and solid, and takes possession of the crevices between the teeth and of the lower part of their surface close to the gum. It accumulates chiefly in the lower jaw, and is first discerned on the incisors, where owing to the dark hue it imparts, and the occasional roughness experienced by the tongue coming in contact with it, it is often mistaken for the commencement of decay. If no means are taken to remove it from the inner surface, it finally extends to the outside, and proceeds from the tip of the gum, nearly to the cutting or grinding surface of the teeth. The necessity for arresting its progress, ere it accumulates to this degree, will be evident, when we consider that not only is the individual thus circumstanced deprived of the advantage to his appearance of a good set of teeth, but he has also to look forward to diseases of the gum, to the falling out of his teeth before they are in themselves diseased, and, what is even more important, he is very likely to suffer in his general health, for it is the opinion of dentists and, medical men that a neglected state of the teeth, leads to a contamination of the secretions of the mouth, and acts with a more or less injurious effect on the stomach and the other digestive organs.

In objection to what has been stated, it may be said that so much care cannot be more necessary in our case than in that of the people of uncivilized nations, who generally appear to have good teeth and who are not likely to bestow any attention on their preservation. In answer to this we may observe that in the primitive modes of life, the simplicity of diet, and the abundance of exercise, tend to preserve general health, and at the same time act as a preventive to many of the minor evils which we suffer from, and as to the neglect of the teeth attributed to men in a barbarous state, we are not warranted in charging them with it, for travellers have mentioned their peculiar modes of performing this operation, and the inventions they employ to answer the purpose of our brushes, &c. It is said that even the Malays and Japanese, who dye their teeth black, are careful to clean them after every repast.

It now remains to speak of the best methods of preserving the valuable gift of a good set of teeth, and of arresting the evils to which we, owing to our

manner of life, are more subject than the rude and uncivilized portion of mankind. In the first place attention to the teeth should begin *early*. As soon as the permanent teeth begin to take the place of those which are called the milk teeth a greater share of attention becomes necessary, and instead of allowing children to neglect the use of the tooth-brush, until they are twelve or fourteen years of age, parents should encourage the habit of brushing the teeth every morning and evening from the period at which the change takes place. From this practice, regularly adhered to, the most beneficial results might be expected to ensue. In the next place, proper materials should be employed in the cleansing of the teeth. Brushes should be firm and elastic, not so stiff as to injure the gums and scratch the enamel, or so pliant as to do their work imperfectly. They should be of convenient size for introducing to the extremity of the jaw, so that the more remote teeth, as well as the prominent ones, may be thoroughly brushed on all sides, and the inner surfaces of the teeth duly attended to. Tooth powder should be simple, and of such a character as to cleanse the teeth without injuring the enamel. A mixture of two parts of chalk, and one of well burned charcoal, in fine powder, is an excellent dentifrice. Red bole, cuttle fish, pumice stone, &c. are frequently employed: the latter, however, is objectionable on account of its hardness. These simple powders may be considered inefficient to produce the dazzling whiteness of the teeth desired by many persons, but with early and persevering attention, they will be found all that can be wished for. Where neglect and indifference have brought the teeth into a bad state, and they have become greatly discoloured or covered with tartar, something more is requisite to restore them to their natural appearance. If the acid of some more powerful dentifrice is employed, and the tartar still remains on the teeth, the next step to be taken is, its removal by means of dental instruments, or an application to the dentist himself. The removal of tartar by means of a few simple instruments, which may be easily procured, is in our opinion a very safe operation, and one which any person may perform for himself, without fear of injury to the structure of the teeth. It is scarcely necessary to add that the teeth having been once cleared of the tartar, care should be taken to prevent its reformation by the use of the brush and powder as before described, so that a frequent use of instruments may be avoided. Before we close these remarks we may add the recipe for a dentifrice which has been found beneficial in its effects, although it ought only to be used occasionally. Take of alum and myrrh each one ounce, of camphor and of cream of tartar each half an ounce, and reduce the whole to an impalpable powder.

We have not yet alluded to the management of the teeth, when they have begun to show symptoms of decay. The method of treating the diseased tooth should differ according to the part affected. If the carious part be near the surface, it may be completely cut out, and the tooth saved for future usefulness; if in the very heart of the tooth, there can be little done for it, except the application of creasote, which will probably relieve the pain of tooth-ache, or the trial of one of the various ways of stopping up the cavity with metal, cement, &c., or the extraction of the tooth.

It should be remembered that the extremes of heat and cold are alike injurious to the enamel of the teeth and that when this beautiful surface is once injured the internal structure will speedily become liable to decay. On minute inspection, the most beautiful set of teeth will scarcely be found free from injury in this respect. Numerous small cracks may be observed, branching out in all directions, and these probably have been occasioned by the cause we have just named. These cracks admit air and moisture to the tooth, which the enamel was intended to protect from both, and at length a sensation of pain accompanies exposure to the cold air, or the use of liquids that approach the extremes of heat and cold.

INSCRIPTION IN A CHURCH-YARD:

"DO NOT PLUCK THE FLOWERS; THEY ARE SACRED TO THE DEAD!"

Oh! spare the flowers, the fair young flowers,
The free glad gift the summer brings;
Bright children of the sun and showers,
Here do they rise, earth's offerings.
Rich be the dew upon you shed,
Green be the bough that o'er you waves,
Weariless watchers by the dead,
Unblenching dwellers 'midst the graves!
Oh spare the flowers! their sweet perfume,
Upon the wandering zephyr cast,
And lingering o'er the lowly tomb,
Is like the memory of the past.
They flourish freshly, though beneath
Lie the dark dust and creeping worm,
They speak of Hope, they speak of Faith,
They smile, like rainbows, through the storm.
Pluck not the flowers—the sacred flowers!
Go where the garden's treasures spread,
Where strange bright blossoms deck the bowers,
And spicy trees their odours shed.
There pluck, if thou delightest, indeed,
To shorten life so brief as theirs,
But here the admonition heed—
A blessing on the hand that spares.
Pluck not the flowers! In days gone by
A beautiful belief was felt,
That fairy spirits of the sky
Amidst the trembling blossoms dwelt.
Perhaps the dead have many a guest,
Holier than any that are ours,
Perhaps their guardian angels rest
Enshrined amidst the gentle flowers!
Hast thou no loved one lying low,
No broken reed of earthly trust!
Hast thou not felt the bitter woe
With which we render dust to dust!
Thou hast! and in one cherished spot,
Unseen, unknown to earthly eyes,
Within their heart, the unforgot
Entombed in silent beauty lies.
Memory and faith, and love, so deep
No earthly storm can reach it more—
Affection, that hath ceased to weep,
These flourish in thy bosom's core.
Spare then the flowers! With gentle tread
Draw near, remembering what thou art,
For blossoms sacred to the dead,
Are ever springing in thy heart.

[M. A BROWNE, *in the Dublin University Magazine.*]

THERE are, in Great Britain and Ireland, six or seven million head of cattle. But these do not afford a supply of leather sufficiently large for the numerous uses to which it serves. We import hides from Lithuania, and other provinces of Russia, where the cattle run wild in the forests: and in Paraguay the vast herds which range the boundless plains, are pursued and skinned, while the rest of the animal is of so little value, that the carcase is left to rot upon the ground. The troubled state of these South American states has kept up the price of leather, by preventing the trade in skins. The largest tanneries in the world are at Bermondsey, on the outskirts of London.

The value of articles made of leather is fifteen millions per annum, and shoes take more than one half of that amount. Leather is not an article we export, for other nations can supply themselves more cheaply than we can. Gloves are made at Worcester, Yeovil, Ludlow, and Woodstock.

SYRACUSE, IN SICILY.

ST. JOHN'S CHAPEL, OVER THE CATACOMBS AT SYRACUSE.

It has been justly said, that the fame of states now no longer existing, lives in books or traditions, and we reverence their memory in proportion to the wisdom of their laws, the private virtues of their citizens, the policy and courage with which they defended their own dominions, or advanced their victorious standards against those of their enemies. Some nations which have rendered their name illustrious, through their virtues and valour, had but a very confined sphere to move in; while other commonwealths and monarchies have subdued worlds, and roamed over whole continents in search of power and glory. *Syracuse* must be numbered in the former class, and among the most distinguished of that class: in public and private wealth, magnificenee of buildings, military renown, and excellence in arts and sciences, it ranked higher than most nations of antiquity; the great names recorded in its annals still command our veneration, though the trophies of their victories, and the monuments of their skill, have long been swept away by the hand of time or of violence.

Syracuse is a town or city situated in Sicily,—a town resembling Rome or Athens, by the intermixture of modern buildings with the mouldering remains of antiquity. It was founded by a colony of Corinthians, more than 700 years before the Christian era, and became the largest and most wealthy city in Sicily, possessing, according to Thucydides, 300,000 inhabitants, a larger number than that contained by Athens, or any other Grecian city. It was at one time governed as a republic, and at others by Gelon, Hiero, Dionysius, and other rulers. It was besieged, B. C. 414, by the Athenians; and again, B. C. 215, by the Romans under Marcellus and Appius. It was defended for nearly three years by the genius and enterprise of Archimedes, but at length fell into the hands of the Romans, 212 B. C.; in whose hands it continued till the downfall of the empire. The Vandals then seized it, from whom it was afterwards wrested by the Goths. From the Goths it passed into the hands of the Emperor of the East, and from him to the Saracens. Subsequently, it was taken by Roger of Naples, and has since then shared the mutations of European States.

The ancient city was of a triangular form, twenty-two miles in circuit, and consisted of four parts, surrounded by distinct walls; viz., *Ortygia*, between the two harbours; *Acradina*, extending along the seaside; *Tyche*, an inland division; and *Neapolis*, forming the western part. All these parts now present ruins replete with associations for the classical student. In the quarter of Ortygia is a large pool of water defended from the sea by a wall, and almost hidden by houses on every other side; the water is not salt, but brackish, and fit for no purpose but washing linen. This was once the celebrated fountain of Arethusa, on which the poetical imaginations of the ancients founded the fable of Alpheus and Arethusa.

The quarter of Acradina contains, among other records of antiquity, the celebrated *Catacombs*. In the low grounds of the district stands the church of St. John, represented in our engraving, one of the oldest Christian churches in Sicily. The pillars are in the oldest, heaviest, and simplest style of Gothic. But the principal circumstance connected with it is, that it covers the entrance to the catacombs. These catacombs are subterranean vaults, consisting of numerous streets, hewn with great care and regularity. The principal street or avenue is about ten feet high, and runs to a great distance in a straight direction, being full as broad as the generality of streets in a Sicilian town; but its whole length cannot be determined, as the sinking of the ground has filled it up in one part. As the traveller advances, he observes deep contiguous recesses on each side, cut in the rock, with arched roofs containing many recesses for the dead; some of them appear to have been private property, from the vestiges of gates and locks by which they were secured. A great number of streets run parallel to the principal one, which is also intersected by transverse ones at oblique and right angles; whilst others, taking a circuitous course, lead to spacious squares and corridors, formed by different converging avenues. In the more conspicuous situation which these areas afford, there are found many detached tombs of a large size, which were probably destined for the heads of families. The walls of the recesses are covered with a fine stucco, painted upon a vermilion ground with various colours and devices, among which may be perceived a number of monograms and symbolical devices, palm trees, doves, peacocks, and funeral ceremonies; but the smoke of torches has greatly impaired the beauty of their designs. These extensive vaults are ventilated by the external air, admitted through conical or bell-shaped apertures over the above-mentioned squares and corridors. In

exploring the burial-place of the ancient Syracusans, the traveller is surprised to find himself returned to the same spot whence he set out, but on a lower story. When these sepulchral chambers are illuminated with torches, the lurid glare of the light produces a curious and even sublime effect. It appears like a high and solemn festival in honour of the dead; a vivid imagination might picture to itself shades of ancient saints and martyrs starting from their deep repose, and gliding down the long arcades, till they are lost in the distant gloom. But without entering into the field of imagination, we may state that these catacombs are supposed to have originated by quarrying for the purpose of extracting stone; that in the hollows thus excavated, the primitive faithful assembled secretly in times of persecution; and that they were afterwards employed as burial-places.

On a hill near St. John's chapel, is a convent of Capuchins, to which is attached a garden contained in the area of immense excavations, made by cutting stone for the ancient city. The vaults of the convent have the property of drying the bodies of the dead in a very short space of time; after which they are dressed in religious habits, and placed as statues in niches on each side of subterranean vaults*.

The quarter of *Neapolis* contains the far-famed "Ear of Dionysius," of which a wood cut has appeared in the *Saturday Magazine*, Vol. XIV., p. 110. Round a very spacious court or area, runs a high wall of rock, so artfully cut, as to cause the upper part to project very visibly out of the perpendicular line, and thereby defeat every attempt to climb up. Near the summit of the rock is a channel, which conveys part of the waters of an aqueduct to the city, and can with ease, at any time, be stopped and turned into the area or open court. In the centre of the court, is a large insulated stone, and upon it the ruins of a guard-house. Vast caverns penetrate into the heart of the rock, and serve, in our own day, for saltpetre works and rope walks; but the most noted of the excavations is the *ear* above alluded to. It is 18 feet wide, and 58 high, and runs into the heart of the hill, in the form of a capital S. The sides are chiselled very smooth. and the roof is coved, gradually narrowing, almost to as sharp a point as a Gothic arch: along this point runs a groove or channel, which served, as is supposed, to collect the sounds that rose from the speakers below, and convey them to a pipe in a small double cell above, where they were heard with the greatest distinctness; but this hearing-place having been too much opened and altered, has lost its virtue, as those who have been let down from the top by a rope have found. There is a recess like a chamber about the middle of the cave, and the bottom of the grotto is rounded off. Some writers have doubted whether this excavation could have possessed the properties attributed to it; but Swinburne thinks it impossible, after an attentive survey of the place, to doubt of its having been constructed intentionally for a prison, and alistening place. Rings are cut out of the angles of the walls, where no doubt the more obnoxious criminals were fastened. The echo at the mouth of the grotto is very loud; the tearing of a piece of paper will make as great a noise, as a blow of a cudgel on a board will produce in the open air: a gun yields a report resembling thunder, which continues to reverberate for several seconds. It is said that an Italian musician of the seventeenth century, composed a canon for two voices, which, when sung in this cavern, appeared to be performed by four.

Neapolis also contains the remains of an immense amphitheatre, which was three hundred feet in length, and two hundred in breadth. As the greater portion of this place of entertainment was hewn out of the solid rock, little detriment has accrued from the lapse of ages; but all which was built upon this foundation has disappeared. What remains forms a most romantic scene, for the white steps are half hid with bushes of various kinds: some tall poplars wave their heads over the ruin, and the waters, in cascades and beautiful masses, fall from rock to rock. When the amphitheatre was in its perfect state, the approach to the upper seats was upon a level with Tyche: Acradina lay even with the middle part; and the people from Ortygia and Neapolis ascended to it. Two broad roads carried deep through the rock in a semicircular form, meeting at the theatre, opened easy communication between the high and the low town. On each side sepulchral caves are hollowed out, and some still retain the bodies deposited within them. No part of the proscenium now remains, the stone having been used in making fortifications, though many quarries were open all round, where stones might have been procured with almost equal ease.

There are numerous other remains of antiquity, in the wide extent of ground on which formerly stood Syracuse, but we must quit them, in order to say a few words respecting the modern town. The only part at present inhabited, is the south-east corner of the old town, comprising the quarter of Ortygia, and part of that of Acradina. It is insulated, walled, and entered by drawbridges. The streets are regular, but narrow, and the houses tolerably built. It contains a number of churches and convents, and a hospital. The ancient temple of Minerva is now used as a cathedral, but when it was used in its former acceptation, a statue of Minerva was placed on the top, holding a broad refulgent shield. Every Syracusan that sailed out of the port, was bound by his religion to carry honey, flowers, and ashes, which he threw into the sea, the instant he lost sight of the holy shield: this was to ensure a safe return.

The landscape around Syracuse, is described as being exceedingly magnificent; the majestic Mount Ætna appearing in the background towards the north-west. But everywhere are seen symptoms of those terrible visitations, earthquakes, to which Sicily has been much subject. A very destructive shock was experienced in the sixteenth century. But a far greater occurred in 1693; on the 11th of January, the earth shook during a period of four minutes, and overturned almost every town on the eastern coast of Sicily; one fourth of the inhabitants of Syracuse, perished under the ruins of their houses, and at another town, Augusta, one half of the inhabitants were crushed to death.

Although a population of three hundred thousand souls once filled Syracuse, it does not now contain more than twenty thousand. It is called *Siragosa* by the Italians and Sicilians.

To read with Newton's ken the starry sky,
And God the same in all his orbs descry;
To lead forth Merit from her humble shade;
Extend to rising arts a patron's aid;
Build the nice structure of the generous law,
That holds the freeborn mind in willing awe;
To swell the sail of Trade; the barren plain
To bid with fruitage blush, and wave with grain;
O'er pale Misfortune drop, with anxious sigh,
Pity's mild balm, and wipe Affliction's eye;
These, these are deeds Britannia must approve,
Must nurse their growth with all a parent's love;
These are the deeds that public Virtue owns,
And, just to public Virtue, Glory crowns.

BISHOP BARROW.

* See *Saturday Magazine*, Vol. VII., p. 183.

THE SHARK. I.

Increasing still the terrors of these storms,
His jaws horrific armed with threefold fate,
Here dwells the direful shark. Lured by the scent
Of steaming crowds, of rank disease and death,
Behold! he rushing cuts the briny flood,
Swift as the gale can bear the ship along;
And from the partners of that cruel trade,
Which spoils unhappy Guinea of her sons,
Demands his share of prey; demands themselves.
The stormy fates descend: one death involves
Tyrants and slaves; when straight their mangled limbs,
Crashing at once, he dyes the purple seas
With gore, and riots in the vengeful meal.—THOMSON.

THERE is no animal regarded with a more fearful and deadly hatred by the sailor than the Shark; an animal whose powers of destruction are of the most formidable description. It follows the ship for miles together, watching for whatever may be thrown overboard, and seizing it with greedy avidity; thus tending by 'ts presence to remind the sailor of the dangers of the deep. No wonder, then, that all on board unite in one common cause against this their unsparing enemy. To entrap a shark, and torture it to death with the most refined cruelty, is an employment which those navigating the seas of warmer climes deem a praiseworthy duty.

CARCHARIAS; or *Sharks,* properly so called, form only a few members of a numerous, powerful, and celebrated family of cartilaginous fishes, called *Squalidæ,* or the Shark family. The genus *Carcharias* includes numerous species; but we propose to confine the anecdotal description we are about to give to the *white* shark, whose tremendous powers, and the fearful effects resulting from their exercise in the native seas of this fish, form generally the popular account of all sharks.

The white, or common, shark, (*Carcharias vulgaris*) has a long body, covered with a hard tuberculated skin, of a brownish ash colour above, and white below. Its head is large; the muzzle rather short and depressed, and pierced with numerous pores. Its tongue is short, rough, and cartilaginous. The upper jaw is furnished with six rows of sharp, cutting, triangular teeth; the under jaw with four rows, with sharper points, but not so thin. The *pectoral,* or breast-fins, are large and powerful: the first *dorsal,* or back-fin, is elevated: the *ventral,* or belly-fins, are small: the *caudal,* or tail-fin, is forked. Indeed the whole structure of the fish, and its great strength, enable it to move with wonderful rapidity, and to perform the same part in the economy of the deep, as tigers and other savage beasts of prey perform on land.

The white shark frequently attains, in the tropical seas, the length of more than 30 feet. The only part of the structure of this animal which seems ill adapted to its habits, is the position of the mouth, which, being placed on the under side of the head, obliges it to turn half round upon its back, in order to seize any object above itself: but this position of the mouth is of advantage, when the animal's food is, as is generally the case, below it at the bottom of the sea. The mouth is deep; and the opening is often as much as three or four feet in diameter; so that this fish is capable of swallowing animals of a large size: a whole carcase, with none of the limbs separated, has often been found in its maw. These creatures are said to scent their prey from an immense distance; and it has been stated by nautical men, who have been engaged in warm seas, that the shark delights in the scene of carnage: that, unscared by the terrors of the battle, it adds a new terror of its own, more revolting, if possible, than the horrible strife of men. The sharks too, follow the peaceful vessel, and pick up whatever is thrown overboard; and when the inhuman traffic in Negro slaves was once so common, shoals of sharks followed in the wake of the slave-ship, waiting impatiently for the bodies of the miserable wretches who had died through confinement and disease. The poet alludes to this circumstance in the extract which stands at the head of the present article.

The shark is so voracious, that in pursuing its prey, it has often been known to fling itself out of the water, and alight on the shore. Its eagerness for food is so great, that it will leap out of the water to the height of twenty feet, to seize a tempting bait. It feeds on its own species; a propensity which is not uncommon to many other kinds of fishes. It has often happened that on cutting open a large shark, smaller ones have been found in the stomach: hence has arisen the vulgar error, that in times of danger the young of the shark take refuge in the stomach of their mother.

When a shark is harpooned, and not able to escape, its companions will generally tear it to pieces. The shark seems to have no favourite food in particular. It will eat seals and mollusca indiscriminately, and provided the quantity be large, the quality is not of much consequence. In fact the shark seems to be the sea-scavenger: its office is to remove animal matter, which, especially in warm climates, would soon putrefy and corrupt the waters and the air: it performs in the deep the same office as that of the carnivorous animals on land; but its dominion being so much more extended, it is endowed with increased powers of consumption and motion.

It is not very difficult to capture the shark: its voracity prompts it to seize with eagerness almost any bait that is held out. The usual mode is to bury a large strong hook in a mass of fat, and to attach the hook to a strong iron chain. If not excited by hunger, the animal will approach the bait, and turn it about with its nose, as if to examine it. It will play about it for a considerable time, and make many sham attempts to swallow it. But if the bait be snatched up, as if it were going to be withdrawn, the shark, fearful of losing its prey, will suddenly seize it, when, finding itself caught, it will make the most violent efforts to escape, endeavouring to divide the chain with its teeth: it will then lash with its tail, and become furious. It even endeavours to get rid of the hook by disgorging the contents of its stomach. The animal is allowed to enfeeble itself by these violent efforts: its head is then raised a little above water: a rope, with a running noose, is thrown out over the tail, and drawn tight: it is thus easily raised on board ship.

The formidable mouth of the shark, its tough skin, its enormous strength, and rapidity of motion, make it the tyrant and despot of the sea. Its only successful enemy, next to man, is, perhaps, the great spermaceti whale. When these two monsters meet, there is often a desperate encounter; but the whale is generally the victor. A shark, seventeen feet long, has been found in the stomach of one of these whales. The shark is also annoyed by numerous animals which infest its alimentary canal. Such animals are called *Entozoa,* or *parasitic* animals, which live within other animals; and it has been supposed that these internal tormentors urge the animal thus inhabited to madness, so that it dashes itself ashore, in the vain hope of escaping from them. This cause, together with the known eagerness of the shark in pursuing its prey, will account for the numbers which are often found on the coasts of their native seas.

The shark produces its young from a sort of egg.

the shell-case of which is brown, and resembles leather. This egg is oblong in form, with tendrils curling from its corners. The young are hatched in these shells, and when sufficiently grown, the end of the case is pushed out by the young shark, (then about seven or eight inches long), which swims out to begin its destructive career.

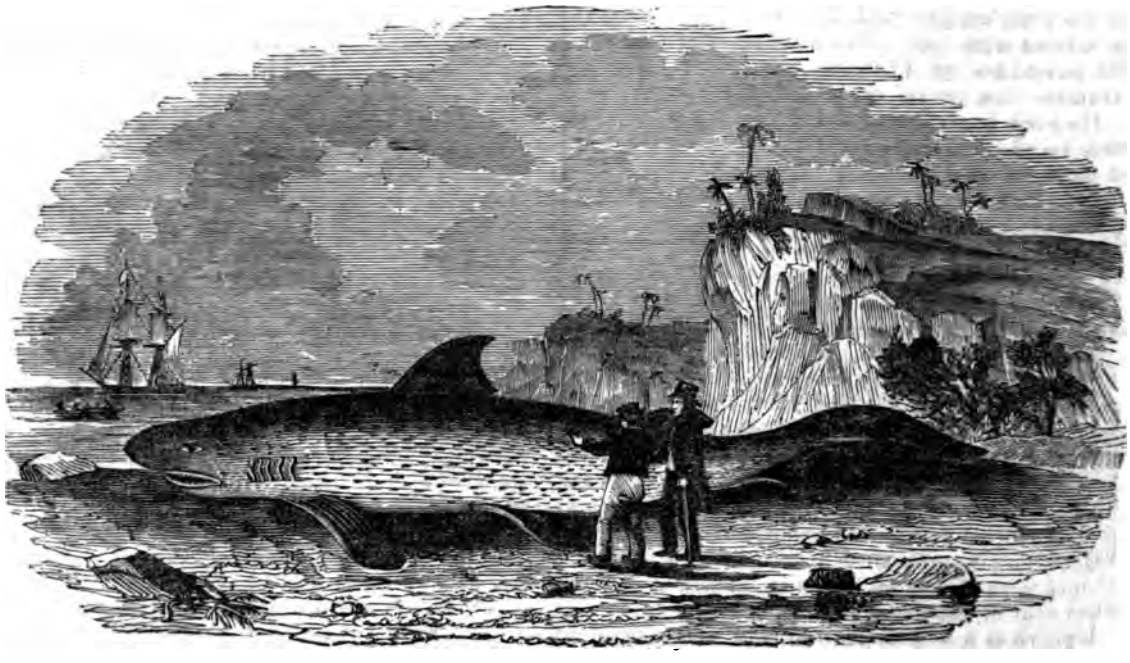
The flesh of the shark is seldom fit for food, except to the rude Negro, who overcomes its hardness and toughness by hanging it up for a week or two, when putrefaction renders the fibres softer: he then eats and enjoys his shark meal. The fat of the shark can be kept for a long time: it hardens by being kept: the Icelanders use it instead of lard, and eat it with their prepared fish: it is generally boiled down into oil. The liver of the shark also affords a large quantity of oil. In Norway the skin of the shark is employed for harness, and in Greenland it enters into the construction of canoes. The fins are often used as polishing tools by the carver and worker in hard wood.

Sharks' teeth are frequently dug up with fossil remains. The writer of this article has in his possession various specimens of fossil sharks' teeth, and he has seen one in which the enamelled portion was four inches and a quarter in length. "That this tooth belonged to one of the family of the sharks," says a modern geologist, "there can be no doubt, and a practised eye will see that it was a species very nearly resembling the white shark, if not identical." Then, by some just calculations as to the size of the shark from whence this tooth proceeded, the same writer makes it appear that it must have exceeded seventy feet in length; and calculating the size of its throat according to our observations on the existing species, the arch of its upper jaw must have been upwards of thirteen feet in length; and as the soft parts which unite the two jaws are capable of great extension, the total circumference of the opening of the mouth was at least twenty-six feet, and the medium diameter nearly nine feet. "But although," says the same writer, "we now meet with no examples of sharks of this size, is it not possible that in those parts of the ocean which lie out of the tract of commerce, and from which the severity of the climate, or the violence of tempests, has driven navigators, creatures resembling this may be found, who, in those unfrequented places, enjoy perfect tranquillity, or, more properly, complete impunity; so that those who thousands of years since infested the margins of the Pyrenees, may likewise have lived sufficiently long to have attained the size we have mentioned?" We may add to this the known gigantic size of many other fossil animals, and, by parity of reasoning, there is nothing ridiculous in inferring a shark to have existed formerly of the length of seventy feet.

If the reader will turn to Vol. III. of the *Saturday Magazine*, p. 186, he will find described a fearful encounter between an Indian and a shark. In our next article we will give another such example.

SHOULD any one applaud the justice and utility of human institutions, and plead this applause in vindication of transgressing, or even instead of observing them, such a plea might expose him to ridicule, but could not screen him from punishment. As preposterously does that man act, who contents himself with confessing Christ, though he does not overcome the world, who admits the right of Almighty God to enforce obedience, in the moment he has determined to disobey, and who arrogates to himself the privileges of a child, while he spurns from him the authority of the Father by whom they are conferred.—DR. PARR.

IN the slow progress of some insidious disease, which is scarcely regarded by its cheerful and unconscious victim, it is mournful to mark the smile of gaiety as it plays over that very bloom, which is not the freshness of health, but the flush of approaching mortality, amid studies, perhaps, just opening into intellectual excellence, and hopes and plans of generous ambition that are never to be fulfilled. But how much more painful is it, to behold that equally insidious and far more desolating progress with which guilty passion steals upon the heart, when there is still sufficient virtue to feel remorse; and to sigh at the remembrance of purer years, but not sufficient to throw off the guilt, which is felt to be oppressive, and to return to that purity in which it would again, in its bitter moments, gladly take shelter, if only it had energy to vanquish the almost irresistible habits that would tear it back!—BROWN.



THE SHARK.

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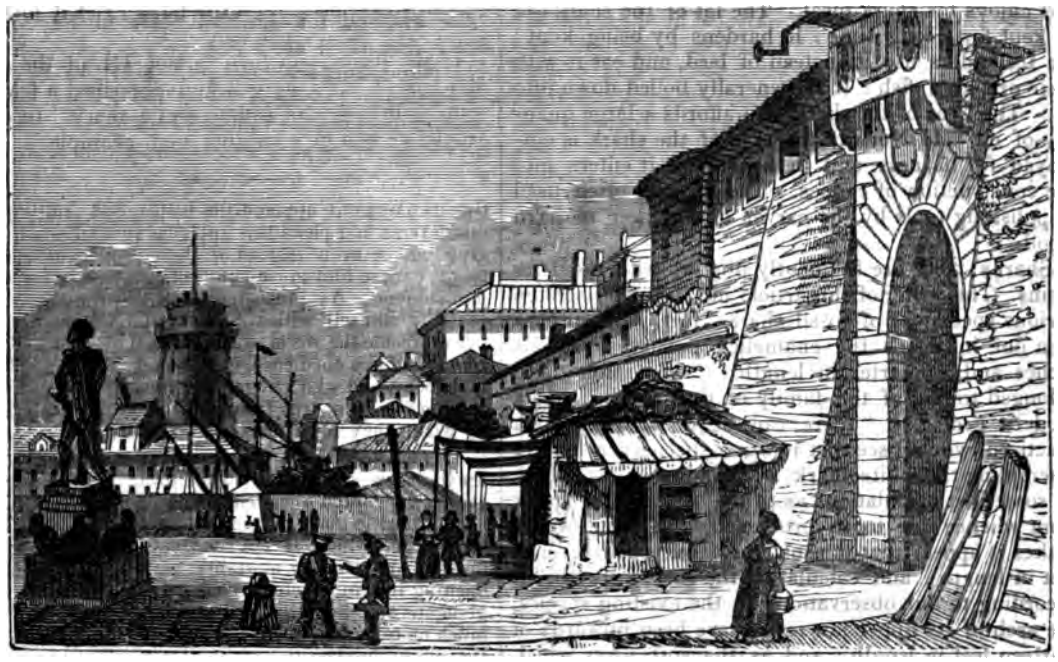
LEGHORN.



VIEW OF LEGHORN.

LEGHORN is the name given in England to an Italian sea-port which ought to be called *Livorno*. It is situated in the Grand Duchy of Tuscany, about fourteen miles from Pisa, and forty-five from Florence. A low plain extends from the southern bank of the river Arno to the hills of Montenero, and in the midst of this plain stands Leghorn. The slope of the hills is covered with the country houses and gardens of the merchants of Leghorn, where a beautiful and extensive view of the sea is obtained.

The town is about two miles in circumference: and there are two other suburbs, one beyond the north gate of the town, and the other, called Borgo Cappuccini, to the south; these two suburbs have of late years greatly increased in size. There is a tolerably large harbour to the town, but it is not sufficiently deep for large vessels; they therefore anchor without the harbour, where the anchorage is safe and good; while smaller vessels can anchor in the harbour.

The western district, called La Nova Venezia, is intersected with canals, by which the goods are carried in boats from the shipping in the harbour, and landed before the warehouses of the merchants. It has been said, that of all the towns in the Mediterranean, Leghorn perhaps most resembles an English town; the inhabitants are, by long intercourse, familiar with the English, and well-disposed towards them. The English burying-ground, situated on the ramparts, is adorned with numerous marble monuments,—among others that of Smollett, who died here.

Leghorn is a well-built town, with streets carefully paved, but rendered dark by the great height of the houses. There are not any superb private palaces here, as in the other towns of Italy. The only wide street is the *Strada Ferdinandea*, running north and south, and leading from Pisa to the port: in the middle of the town it expands into an open square or market-place, called the *Piazza d'Armi*. The north-western quarter of the town, where the ground is remarkably low, is called *Little Venice*, being intersected by canals instead of streets; the chief magazines and warehouses are situated in this division. The outer haven, which is properly the harbour, is formed by a mole six hundred paces in length, which breaks the force of the waves, and even in some measure of the winds. This mole being well-paved, and commanding an agreeable view along the Tuscan coast, is the favourite promenade.

Leghorn is, principally, a place of trade, and wants those attractions which art and refinement have bestowed on the other towns of Italy. The public edifices are numerous and commodious, but not splendid. The archducal palace, the cathedral, and seven parish churches, besides those belonging to convents, and the numerous hospitals, are all plain buildings without any peculiar claim to the traveller's attention. There are also English, Armenian, Greek, and Lutheran, churches here, besides a magnificent synagogue, and a Jami, or Turkish mosque. In the Darsena, is a colossal statue of the Grand Duke Ferdinand the First, by Francanella, on a handsome pedestal, at the four corners of which are bronze figures of slaves with their hands tied behind their backs; this pedestal was designed by Pietro Tacca. The public library is very insignificant; the only gallery of paintings in the town is that which belongs to the Genoese merchant, Lambruschini. The private library of Poggioli is celebrated.

The town is exposed to sea-winds, which frequently blow with extreme violence, raising the sea along the

coast so as to make the dikes and canals overflow. They generally bring with them from the sea a thick mist, which does great injury to marbles and pictures. The same winds carry the clouds inland with great impetuosity, so that the first falls of rain take place over the hills of Pisa: hence, notwithstanding the trifling distance between Pisa and Leghorn, the quantity of rain that falls at the latter place is much less than at the former. The climate is healthy; the surrounding plain is one continued garden; and during the heats of summer the inhabitants of the villages experience no inconvenience from exposure to the night air. The soil produces grain, garden vegetables, and fruits, in abundance; the last being considered the best in all Tuscany. The wines of the surrounding district have the peculiar flavour which characterizes the vintages of the sea-shore. The growth of the cypress is checked by the sea-winds, and most of the trees are stripped of their leaves, and inclined towards the mountains by the violence of the gales. The wells of Leghorn are said to have better water than those of Pisa, yet many of them are brackish, and almost all rise and fall with the tide. At a depth of from one to twenty feet beneath the surface of the soil in the surrounding plain, are found strata of a rock composed wholly of sea-shells, more or less in a state of comminution. These strata extend to the sea-shore, and are in some places covered by the sea. The fossil-shells do not belong to the species which at present inhabit the adjoining seas. In the year 1714 the workmen employed in making a sewer from the New Hospital of Leghorn to that of St. James, found a tree ten or twelve feet long, hollowed within, and apparently intended for a pump, completely imbedded in this rock; cones of pines, the horns, teeth, and bones, of various animals were found at the same time: among other organic remains imbedded in this rock, are those of the deer and elephant.

The straw hats and bonnets exported from Leghorn form such an important part of the labours of the neighbouring peasantry, that it will be interesting briefly to notice the mode of proceeding; for the details of which we are indebted to Mr. Macculloch.

About thirty thousand persons are supposed to be engaged in the manufacture. The description of straw used, which is cultivated solely for the purposes of the manufacture, and not for the grain, is a variety of bearded wheat, which seems to differ in no respect from the spring-wheat grown in many parts of England. After undergoing a certain preparatory process, the upper part of the stems, (being first sorted as to colour and thickness) are formed into a plait of generally thirteen straws, which is afterwards knitted together at the edges into a circular shape called a *flat*, or hat. The fineness of the flats is determined by the number of rows of plait which compose them, (counting from the bottom of the crown to the edge of the brim,) and their relative fineness ranges from about No. 20 to 60, being the rows contained in the breadth of the brim, which is generally eight inches. They are afterwards assorted into first, second, and third qualities, which are determined by the colour and texture; the most faultless being denominated the first, while the most defective is described as the third quality. These qualities are much influenced by the season of the year, in which the straw is plaited. Spring is the most favourable, not only for plaiting, but for bleaching and finishing. The dust and perspiration in summer, and the benumbed fingers of the workwomen in winter, when they are compelled to keep within their smoky huts, plaiting the cold and wet straw, are equally injurious to the colour of the hats, which no bleaching can improve. The flats are afterwards made up in cases of ten or twenty dozen, assorted in progressive numbers or qualities, and the price of the middle or average number governs the whole. The *Brozzi* flats bear the highest repute, and the *Sigua* are considered secondary; these names are given to the flats from the districts where they are plaited. The demand for these hats is chiefly from England, France, Germany, and America, but the kinds mostly required are the lower number; the very finest hats being considered too expensive by the generality of buyers.

The demand for Leghorn hats in England has greatly fluctuated according to the skill with which home-made plaits are executed. During the war, the importation of Leghorns being interrupted, great endeavours were made to improve English straw-plaiting, which endeavours were to a considerable extent successful. The number of foreign straw hats imported varies from one to three hundred thousand annually.

We may now briefly notice the chief points in the history of Leghorn. In the eleventh century it was only known as a parish or village belonging Pisa, and after being ravaged by wars in which its more powerful neighbours were the principal actors, it was sold to the Genoese for 26,000 ducats. From them it was purchased by the Florentines, for the increased price of 100,000 ducats. The new possessors improved the place by erecting walls and docks; and partly from this circumstance, partly by the gradual filling up of the harbour of Pisa with mud, Leghorn gradually attained precedence, as a port, of the last named town.

The family of the Medici, in the sixteenth century, did much for the improvement of Leghorn. They built a mole and a lighthouse, and made it the station of the galleys of the military order of St. Stefano, whose avocation, like that of St. John of Jerusalem, was to make war against the Mohammedans: they granted to all new settlers at Leghorn privileges and immunities from taxes, and security from pursuit on account of debts contracted or penalties incurred in other countries:—they raised regular fortifications round the town, excavated a navigable canal from the sea to the Arno, raised fortifications, built warehouses, a fortress, a lazaretto; and finally, invited foreign merchants, whether Greeks, Armenians, Turks, Jews, or Moors, to come and settle there without fear of molestation on account of their religion. This line of conduct drew many persons to Leghorn, who were the means of increasing the importance of the town.

Leghorn has continued to form part of the Florentine state, since called Tuscany, and has flourished under the judicious rule of the Grand Dukes. It escaped the troubles consequent on the French revolution pretty well; but when Bonaparte seized Tuscany in 1808, Leghorn suffered severely: the merchants' establishments were shut up, and ships seldom entered the harbour, but when, in 1814, a change was brought about in the state of Europe, Leghorn was placed upon her old footing, and has gradually regained her wealth and influence. One of those emblems of modern times, a railroad, has been commenced between Leghorn and Florence, which will be fifty miles long, and for which about a million sterling has been subscribed. An aqueduct has also been constructed.

Leghorn is the principal port from whence the products of central Italy are exported and the produce of other countries imported. The exports are principally silk, straw hats, oil, iron, paper, potash, alabaster, coarse woollen cloths, coral (which is gathered on the coast of Sardinia, and manufactured into trin-

kets at Leghorn) anchovies, and other articles: the value of the straw hats exported is said to be about four millions francs annually, and that of silk not much less. The principal imports are, English cotton goods, hardware, French woollen, corn from the Baltic, salt fish, and colonial articles. About six hundred vessels enter the port annually, besides two thousand coasters from the adjoining ports. The population amounts to about seventy-five thousand.

THE TEAZLE.

THE common teazle (*Dipsacus fullonum*) belongs to the fourth class and first order of Linnæus, and gives a title to an order in the natural system, namely, *Dipsaceæ*. The plants of this order are, with the exception of the teazle, few and unimportant; though some of the species are admitted into our flower gardens, on account of their handsome blossoms: such are the scabiouses, of which the purple and starry kinds are common hardy annuals.

The value and importance of the teazle arise from the use which is made of its prickly flower-heads in our woollen manufacture, where it appears indeed to be absolutely indispensable, and not to be rivalled by any of the ingenious inventions which have been offered from time to time as a substitute for its use. Without any other preparation than that of a careful drying in the sun, the heads of this plant are better fitted than any other known material for raising the nap on cloth, removing knots and unevenness, without injury to its texture, and bringing it to a fit state to receive the subsequent operations of shearing and pressing, which, combined with the *teazling*, give to it the beautiful equality of surface we so much admire.

The head of the teazle is composed of a great number of flowers, united together in a conical form, but separated from each other by a long chaffy substance, at the end of which is a fine *hook*, the part so valuable to the manufacturer. These hooks, while they are strong enough to overcome a slight impediment in their passage over the cloth, are yet sufficiently yielding to give way and break when they become fixed in a knot which they cannot disentangle: hence their superiority over metallic substances, which, instead of yielding, must tear or deface the material on which they are employed, and thus greatly overbalance any advantage which might result from their more imperishable nature. The quantity of teazles required in the clothing districts is immense, while the supply is so precarious as to make them sometimes excessively dear. It is on this account that so many attempts have been made to supersede their use, and to introduce metallic teazles, of an unchangeable nature, possessing the valuable qualities which are found in the vegetable; but, as we have already stated, these attempts have, in a great measure, failed, or, at least, their results have not been sufficiently satisfactory to cause the common teazle to be discarded from the most eminent manufactories.

In teazling by hand, a number of the prickly heads of the plant are arranged in a small wooden frame, having crossed handles eight or ten inches long; these frames have then somewhat the appearance of curry-combs, and are used by two men, who scrub the face of the cloth as it hangs in a vertical position from two horizontal rails, made fast to the ceiling of the work-shop. The cloth is first wetted, and worked with the teazles in the direction of the warp, and then in that of the weft; so that the fibres are effectually raised, and the cloth is prepared for the process of shearing. The teazle-heads soon become clogged, or filled with flocks of wool; and it is then necessary to take them out of the frame, and deliver them over to children, whose employ it is to clear them from this incumbrance, by picking out the flocks with a steel comb. There is also another cause for their being occasionally removed from the frame. The moisture, which they receive from the damp cloth, weakens their points, and renders them inefficient in their work until they have been dried afresh, and restored to their former state. The dressing of a piece of cloth consumes from fifteen hundred to two thousand teazle heads; and this large consumption makes the cultivation of these plants in clothing districts occasionally a source of considerable profit. We say, *occasionally*, for the teazle crop is by no means to be depended on. The seasons have a more than ordinary influence upon it; a continuation of damp weather being ruinous to the head of the plant, which retains and absorbs moisture till it is in a state of decay, and utterly unfitted for the use of the manufacturer. At such times, and especially if the stock on hand be small, the price of teazles becomes very high, and sometimes arrives at upwards of twenty pounds the pack. By a *pack*, we mean a collection of nine thousand large, or ten thousand small heads; the small or middling-sized heads being, however, rather preferable to the others, for the use to which they are applied. The average price of a pack is considered to be from five to seven pounds.

In large manufactories teazling is not performed by hand, but by means of a machine called a *gig-mill*, which originally consisted, and does still consist in most places, of a large cylinder, bristled all over with the teazle heads, and made to revolve rapidly while the cloth is drawn over it in different directions. The introduction of these mills into France in 1802, by an English mechanist, of the name of Douglas, has been the means of generally superseding the practice of teazling by hand in that country.

The cultivated teazle is a biennial plant, and the method of sowing it is in drills on strong land, where it is thinned by the hoe, and kept clear from weeds in the first year: in the second, it is also to the interest of the cultivator that it should be kept clean, (though the same attention is not generally paid to hoeing as during the first season;) and when the heads are ripe, they are cut, and dried for sale. There is some difficulty in drying teazles, on account of the care which is required to keep the heads in a proper state, and to save the spines from injury or destruction: indeed, the cultivation of this plant is attended with so much care and trouble, that manufacturers are seldom found to grow them for their own use; neither do we find them a favourite article of speculation with persons who have employment for their time in other ways, and whose farms or other business will not allow of a close attention to the teazle crops in particular. This plant is said to impoverish the soil on which it is raised; but some of those who have given attention to the subject, affirm that the accumulation of weeds which is allowed to take place in many instances during the second year, deteriorates the soil, and is likely to prove more injurious than the cultivation of the plant itself.

The author of the *Journal of a Naturalist* mentions it as probable, that the teazle is not a native of this country, but was originally introduced by some of the numerous foreign artisans, who have taken refuge in England. As to the time when it began to be cultivated here, he has the following remarks:—"The manufactory of cloth was certainly carried on in England during the reign of Richard I.—perhaps in his father's reign; but it was probably not until after the

tenth of Edward III. that the teazle was cultivated to any extent with us; for, about that time, the exportation of English wool was prohibited, and the wearing of foreign cloth opposed by government. Flemish artisans were encouraged to settle in this country, and carry on their trade with every liberty and protection. A regular mart was established, and the tuckers or woollen weavers became an incorporated body; particular towns began to furnish peculiar colours—Kendal its green, Coventry its blue, Bristol its red, &c.; and from this period, I think we may date the cultivation of the teazle in England." The wild teazle (*Dipsacus sylvestris*), of which the clothiers' teazle is considered by some botanists to be merely a variety, is common in our hedges, and well deserving of attention. The head of the plant is exceedingly beautiful, bearing an abundance of small lilac blossoms, each in its separate sheath or cell; and the leaves, stalk, and calyx also are very beautifully formed. The axils of the leaves usually contain a quantity of limpid water, which is sometimes very acceptable to travellers.

THE SHARK. II.

REQUIN is the term by which the white shark is known to the French. The derivation of this term is somewhat fanciful. A French writer thus defines the term:—

The strength and arrangement of the teeth of this animal, the rapidity of its movements, its frequent appearance in the midst of tempests, and the phosphoric light with which it then shines, lead us to an explanation of its name, which is derived from the word *requiem*, so commonly used to describe death and endless *repose*. Terrible even when subdued and loaded with chains, struggling with violence in the midst of its bonds, still powerful though bathed in its own blood, and able with a single blow of its tail, to scatter destruction around, even at the point of death! Such is the Requin.

We promised, in our last article, to illustrate the formidable powers of the white shark, by relating a fearful struggle between this animal and a human being. The narration we are about to give appears now for the first time in English.

In the year 1831, an American ship, named the *Olympus*, anchored off the Island of Bourbon, in the Indian Ocean. Night was coming on, and a gentle gale from the offing scarcely swelled the little waves which rolled on calmly, and broke upon the adjacent shore. Part of the sailors had obtained permission from their officers to go on shore and refresh themselves after the fatigues of the day.

The quarter-master was standing on deck, contemplating the scene of tranquillity around him: the blue waters seemed to invite him to a refreshing bath, and he was soon undressed; and, mounting on the barricade, plunged into the sea; he was an excellent swimmer, and was soon a considerable distance from the ship.

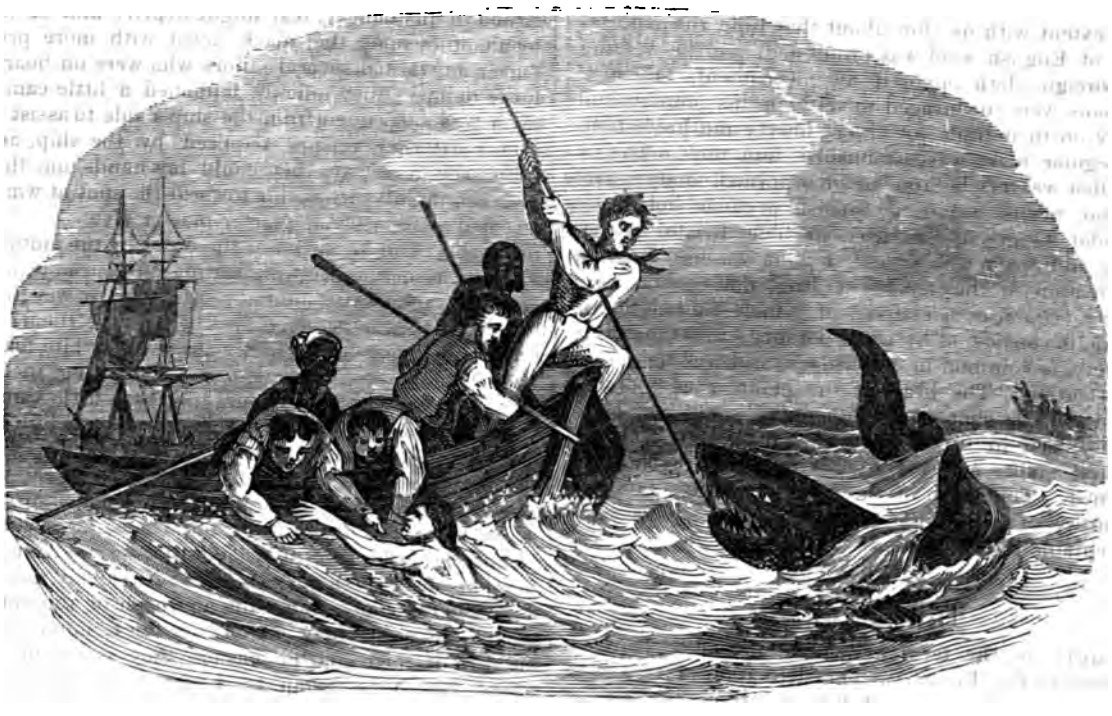
The cook of the ship, a negro, had made himself a seat in the shrouds, and sat watching the skilful manœuvres of the quarter-master; when, by chance directing his eyes to the offing, he thought he perceived the black fin of a shark swimming near the surface of the water. The large size of this fin having at first made him think it was only a plank of wood floating on the water, he paid little attention to it; but a more attentive examination convinced him that one of those frightful monsters of the deep was approaching. A cold shudder agitated all his limbs, and his first impulse was to cry out to the quarter-master to come on board instantly; but the fear of suddenly alarming the swimmer, paralysed his voice. He thought that, if the quarter-master were suddenly warned of his danger, fear might deprive him of the means of escape; the black acted with more prudence: he warned several sailors who were on board, of the danger; they quickly launched a little canoe, which was suspended from the ship's side to assist in several external repairs required by the ship, and seizing the first oars they could lay hands on, they rowed as rapidly as possible towards the spot at which they had just seen the quarter-master dive.

The vibration produced in the water by the motions of the swimmer, and by the rowing of the canoe, had probably excited the animal's attention: it was seen in the distance, advancing swiftly towards them; its dorsal fin tracing on the sea a furrow of white foam. But the diver did not reappear: delighting in his exercise, and perhaps encouraging that little vanity which alloys our nature, to do his best before the little group of spectators who, as he thought, were watching him from the deck, he gambolled in the waters and under them, ignorant of the rapid approach of the terrific monster, and ignorant also of the anxiety of the little band of friends who were advancing spontaneously to share his peril. Anxiously did the sailors in the canoe watch the approach of the shark, as anxiously did they watch for the termination of the dive of their quarter-master; they saw him nowhere, and hope began to depart. At length, the head of the sailor was seen in the hollow between two waves, and a few yards off appeared the grayish mass of the monstrous shark: the transparent waters enabled them to see that it was indeed a monster; they foresaw with anguish the struggle that must soon be commenced between themselves and this formidable enemy: a frightful contest in which the stake was a man, and that man their comrade and friend.

"Take care, Williams," exclaimed one of the sailors to the master, who, quite astonished on reappearing at the surface of the water, at seeing a canoe near him, did not dare interrogate his comrades; "take care, Williams, sharks have been seen from the *rigging*—it is not safe to bathe any longer;—be quick, get into the boat." The sailor who spoke this was grasping the handle of a boat-hook, the only offensive weapon they had to oppose to the imminent danger to which the master was at this moment exposed. "Quick! quick to the boat!" exclaimed the others in accents of terror, which would have sufficiently warned the master of danger, had the tumult of the waters caused by the swimming monster failed to do so.

The unhappy master darted towards the canoe, and the rowers exerted their utmost efforts to join him. Those sailors who were not furnished with oars, extended their arms towards him; every one's heart palpitated between hope and fear; every one measured with a scared eye, the distance which separated the monster from its prey. The negro threw out a rope which chanced to be in the boat; but fear had already so far overcome the poor swimmer, that his efforts were no longer well directed, and he wasted his strength in vain attempts to escape. His arms were held out to his comrades, but they could not yet reach him; the shark was as near to him as he was to the canoe; stretching forwards at the risk of falling into the water, two sailors held to him their friendly hands. The shark made a violent movement, darted out of the water, turned half round and opened its enormous mouth, "armed with threefold fate;"—a wonderful chance saved the master literally from the "jaws of death."

The sailor who was standing at the head of the boat armed with the boat-hook, although well per-



ENCOUNTER WITH A SHARK.

suaded of the insufficiency of his weapon, struck at the monster, the moment its head quitted the water to seize its prey. The first blow, rapid as an arrow, only cut through the oily skin of the shark; but the second blow, as rapid as the first, was more successful; it went into the mouth of the animal, and there inflicted a terrible wound, the pain of which made the shark quit its prey; it fell into the water, turned upon its back, and snapped upon the weapon, which had fortunately lodged in its mouth. Its fury was manifested by powerful convulsions; it turned upon the little canoe, struck it a violent blow with its tail, and staved it;—but the quarter-master was saved.

The head of the canoe now fell off, and the brave little band of sailors took refuge in the stern; but the water was gaining upon them, and the danger from which the quarter-master had just been so providentially saved, now seemed to threaten the whole of them, for the enraged shark now beat the sea with its tail and pectoral fins, with a fury which the pain of its wound doubled. The boat-hook had broken between its teeth, but the iron had spiked the animal's thick tongue to its palate. It may well be imagined that the poor sailors were terrified at the animal's fury: they were crowded in too great number upon the wreck of a miserable little craft, more than half a mile from the ship, that haven of refuge to which their longing eyes were in vain directed. But not altogether in vain, for help awaited them from another quarter. A schooner anchored near the land, near to which the American sailors had passed in going out to the assistance of their comrade, sent out its long-boat to the wreck of the canoe, which, in a few minutes, must have sunk. The shark, whose voracious instinct was aroused by the presence of human beings, did not abandon the spot, but bounded furiously, excited apparently by the pain of its wound, and by the vicinity of its prey, which had just escaped from it, and was still so near. But the sailors on the wreck, (nine in number,) were soon on board the long-boat of the schooner, and soon after in a condition of safety. The shark continued for a long time to agitate the waters of the roadstead. The story of the quarter-master's escape has been preserved on the coast, and, like a local tradition, is repeated from mouth to mouth, thereby preventing every sailor from bathing in the calm blue waters which are haunted by the requin.

ROTTERDAM IN WINTER.

Rotterdam presents a curious and entertaining scene in frosty weather. The large windows made of the clearest glass, and kept bright by the constant care of the housewives, sparkle in the sun with more than usual lustre; the fine trees planted along the sides of the streets, are feathered with congealed snow; innumerable pleasure-boats and merchant ships lie wedged together in the canals, their rigging, masts, and pendants candied over in the same manner as the branches of the trees; and multitudes of men, women, and children, gliding in their sledges with incredible swiftness and dexterity along the streets and canals, render the whole prospect lively and amusing. But indeed throughout Holland, in winter, the whole country wears the appearance of a fair. The canals from one town to another, are often frozen over for three months together and form a solid floor of ice. The country-people skate to market with milk and vegetables. Sometimes a party of twenty or thirty may be seen, going together, young women as well as men, holding each other by the hand, and gliding away with surprising swiftness. Booths are built upon the ice, with large fires in them; horses run races rough-shod, that is, their shoes are turned up to prevent their falling; every kind of sport is to be seen on the frozen canals. Sledges drawn by the hand, others by horses, and all gaily decorated, and filled with ladies and children covered with warm furs, fly from one end of the streets to another. These sledges have no wheels, but move on an iron rounded at the ends.

The ladies of all the northern countries are extremely fond of riding in traineaux in the winter evenings. These carriages, prettily carved, painted and gilt, are made in the shape of lions, swans, dolphins, peacocks, or any other device, and are fixed on the sledge. The lady on these ocasions is gaily dressed in velvet, sables, lace and jewels, and her head is defended from the cold by a velvet cap turned up with fur; the horse, too, is decorated with feathers and bells and the horns of a stag are fixed on his head. Several pages on horseback, with flambeaux, attend the carriage, to display the equipage and prevent mischief, as they often drive at full speed through the streets in the darkest nights; but it is by moonlight that all this finery contrasted with the snow, makes the most beautiful appearance.

THE OSSETES OF THE CAUCASUS.

DESCENDANTS OF JAPHETH—REMAINS OF CHRISTIANITY AMONG THEM—THEIR CRIMINAL CODE—CUSTOMS—CHARACTER, &c.

THE Ossetes are one of the most remarkable tribes which inhabit the vicinity of the Caucasus. The line of country on which they are settled, comprehends the valleys and glens on both sides of the lofty range of mountains which runs from the Elborus to the Kasibeg, or Mount of the Cross; and the most extensive of those valleys are those of the Upper Terek, Fiag, Aridon, and Urik. Their southern neighbours are the people of Grusia, their western the Mingrelians, and their northern and eastern the Tsherkesses, or Circassians.

The only two travellers of note who have given us any information on the subject of the Ossetes, are, Klaproth, who passed through the country in haste, and could not, therefore, speak from much personal observation; and M. Sjögren, of the Imperial Academy of St. Petersburgh, whose report to that body has reference chiefly to the language of the people. What follows has been collected by M. Gregorieffshsky, a civilian in the Russian service, during his sojourn among the Ossetes, for the purpose of preparing an accurate survey of that part of the country. Having rendered some of their principal chiefs very essential services, he was received by the natives with open arms; their great men met him on the frontier, and, as travelling in that quarter is none of the safest, escorted him to whatever point he wished to move.

The Ossetes are a strictly primitive race, bearing in no one respect the slightest affinity with any of their neighbours, whether Grusinians, Circassians, Lesghis, or Mingrelians. Mr. G. speaks of them as having kept themselves from all intermixture whatever with any other people, and as being a pure, aboriginal race of men, descendants in a direct line from one of the sons of Japheth, who took his course westwards; and thence their name of Ossi. Their language, which has been preserved uncontaminated among them to the present day, is one of the oldest tongues known, and contains radicals for every European language, with the solitary exception of the Finnish. They pronounce their words slowly, like the Germans; in fact, both in manner and in tone, they come so close to the German, that the writer conceives they would understand German if it were spoken to them. In another respect, too, they resemble the Germans, for they have light hair and blue eyes; the tribes of Grusia, on the contrary, having dark eyes and black hair. During the first seven hundred years of the Christian era, when united under one head, the dominion of the Ossetes comprehended the greater part of the territory about the Caucasus, and extended to the banks of the Don and Volga. At the present day, the Chazars, to whom they are tributary, are confined to their native mountains, and all their state economy is dwindled down into semi-barbarism; nay, Christianity itself, which had once struck deep root into their character and institutions, has altogether withered and faded away. The reader may appreciate the justness of this report from what follows. They are without any sort of priesthood, or of holy men, or of hermits, such as are met with among the other nations of the Caucasus; neither have they any churches or other places of worship; nor do they celebrate any religious service on the Sunday. Yet there are spots on which stand the ruins of old churches, for which they have preserved a vestige of veneration. Some are the objects of an inferior degree of esteem so that when they pass by them they merely take off their caps; with regard to the remainder, they dismount from their horses, and pass by them on foot. When they were asked to give a reason for this custom, they were unable to account for it in any other way, than that they considered it right to do so, and had been taught to observe it by their parents. They honour the seventh day by going bareheaded, and are extremely rigid on this point. Whether it rains or snows, or whether at home or on on a journey, they never cover their heads on this day; and there is otherwise no difference whatever between the seventh and any other day in the week. In point of fact, they begin the custom of going bareheaded with the Saturday evening, which they call "Shabate," and never put on their caps again until Monday morning. They have no religious book of any description, nor is the sign of the cross known among them: there is no such symbol to be found, either within-doors or in the open air; and they are equally unacquainted with the symbols of idol-worship. And yet they observe some religious festivals; for instance, that of St. Elias, which falls on the 20th of July, according to the Greek style; and Christmastide. The observance of these days is, however, confined to the preparing of certain dishes, which they partake of freely, setting apart a portion of them in an uninhabited room, in order that the "spirit of the house" may have his meal. It grieves them to the heart when he does not touch it; while, on the other hand, they are delighted when they find any part of the dishes has disappeared. The quintessence of their religion is comprised in a very remarkable prayer put up before their festive repast on those holidays. The oldest individual present places himself by the side of the vessel in which the beef is boiling, and taking a piece of meat and a large bone out of it, which he holds in either hand, and turning his face to the south, pronounces the prayer. It is noticeable, that this aspiration contains no allusion to the Holy Trinity; that, after the Almighty has been invoked, appeal is next made to Saint George, then to the Mother of God, afterwards to the Archangels; next, by sudden ejaculation, to the prophet Elias; and, at the very conclusion, to Christ; and lastly, that their invocations for mercy and pity are also addressed to the mountain-tops, on which they believe the saints to have their abiding place, as well as to the churches on the heights. I here subjoin the prayer itself, in literal translation, from the Ossetic, which I have placed in juxta-position with it.

O God, we pray thee to pour out thy grace upon us: have mercy upon us!	Chtshaw tabudon, chtshawaachtsho fod da chorsh nen rad
Blessed St. George, we pray thee, help us, and have mercy upon us!	Wash Kirgi chtshonda fod, da chorsach nen rad.
O Mother of God, we pray thee, have mercy upon us!	Deda Chtisa tabudon da chorsach, &c.
O Elias, we pray thee, have mercy upon us!	Ilia tabudon, chtshonda fod da, &c.
Ye churches on the heights, have mercy upon us!	Cochodshuar da chorsach, &c.
O St. George Nara*, have mercy upon us!	Naruash Kirgi tabudon da chorsach, &c.
Ye Mountains on high, and all, O ye Apostles and Angels, who abide upon them: we hail you and pray unto you! O help and have mercy upon those who hail and seek ye!	Brussabaeli tshisadta tshidawgita bidiss udonima chtshonda fod, da chorsach nen rad tabudawa.
Ye Grusinian Churches, we pray ye, have mercy upon us; and may all the nations which dwell around you, have mercy upon us†! O Christ, we pray thee, have mercy upon us!	Kuwenniki agwriss Monachtsho fod Gurshistani, tshi Djworta iss chtchonde fod chorsachue rad tut u adami chorsachus rad tut.
God of all goodness, help us according unto thy righteousness!	Restmehenech chtshan namitsnen saresmaks tabudon.

* Nara, a defile in which there once stood a church dedicated to St. George.

† This invocation clearly designates the quarter whence the conversion of the Ossetes proceeded.

Among some communities, with whom the Russians were in favour, and with a view to conciliate their representative, the following addition was made to the prayer:—"Ruskane Djwarten tabudon, Russkane chorsachne radtut christian chtsho fod tabudon, d. c. n. r." which implies, "O ye Russian churches, we pray that ye would obtain grace for us in the eyes of the Christian, Russian Emperor."

Though there is as little of social organization among this people as there are traces of anything like a regular system in religious matters, the head of each family is a man of some consequence: and as the head of the most numerous clanship is relatively highest in estimation, every district and valley has one or two elders who bear superior sway, though not to be compared with the influence or authority which the Arab sheik enjoys. The spirit of democracy, or rather a state of savage recklessness, is far more the characteristic of Ossetian society. In every house the head of the family has a seat of honour reserved for him, consisting of a large chair, having a back and arms, and it devolves upon him to adjudge in all cases of dispute that may arise in the district. On these occasions, each party chooses three heads of families, who are not near of kin to them, as judges; and the six arbitrators hold their meeting in a wood, or upon a mountain, or elsewhere, as the case may be, weigh the various circumstances laid before them, and give their award, either as the circumstances may appear to dictate, or in conformity with prescribed usage. The majority of the questions in dispute are connected with offences against the person, for which there are certain established penalties. A value is set not only upon every individual, but upon every member of his body: this value is assigned in the only coin current among them; to wit, oxen and cows,—a practice analogous with that prevalent among barbarous nations in former ages. The murder of the head of a large family is taxed at eighteen times eighteen oxen: each ox being of the value of about five silver rubles, or eighteen shillings; but the slaying of an inferior head of a family is diminished to nine times nine oxen. The penalty progressively diminishes until it reaches its minimum of eighteen oxen, which is the value of an ordinary male. I forgot to ask at what rate the value of a female is fixed. Every penalty is, however, subject to modifications according to circumstances: in some cases it is raised, but in others decreased. If the judges cannot agree upon their award, either fresh judges are selected, or open war between the parties is declared: but if they agree, they keep the sentence secret, and only disclose it gradually. For instance, they begin by announcing to the offender, that he has so many oxen to deliver to the injured family, and that in due time, he will be made acquainted with the other terms of his sentence. These are kept religiously concealed until the ensuing year, when they direct him to make over a further portion of his herd to the injured party. And a year after this, they give him notice in such terms as these: "Now you have so many sheep to pay, and the rest of the sentence will be duly made known to you." He must wait till the fourth year revolves, when the last instalment of his sentence is announced to him; and then the whole affair is brought to a close, and both parties condemned to bury all in perpetual silence. By this process, the injured family are kept from giving the rein to the first burst of their resentment, which cools down, and is at last fully appeased by the restitution made to them; while the offender feels the penalty modified by not having to pay it at, perhaps, a costly sacrifice, in the first instance. If either party refuse to abide by the sentence, he must prepare to encounter the hostility of the judges as well as of the hostages he has given, for each party is obliged to find three individuals as a warranty for his abiding by the award.

The worst class of the Ossetes is the "Keshelzi," a small tribe, who inhabit the more elevated part of the mountains on the confines of Grusia and Iremethia. They are almost constantly engaged in marauding parties, or, if quiet for a moment, in making preparation for a fresh one. For the purpose of collecting a force on these occasions, they send messengers into the valleys and villages, acquaint the invited with their plan, the names of the leaders, &c., and seduce the young men to enlist. Mingrelia, Grusia, and the adjacent countries, suffer much from their inroads.

An essential difference exists between the characters of the Ossetes who inhabit the wooded and fertile valleys, and those who are settled in the bleak and barren highlands. Their mode of life, too, is altogether dissimilar. The houses in the lowlands are built of wood, but among the mountains, of stone: the former have but a single floor, the latter invariably three, raised as high as a watch-tower. The ground-floor of these towers hold the cattle; the middle floor, where the family abide, is reached by a ladder, which is removed at night. A gallery frequently runs round this floor, and the uppermost is the receptacle for their chattels and provisions. The houses in the valleys are usually collected into groups of from twenty to thirty; on higher ground they dwindle down to two or three; and on the highest, the dwellings become isolated fastnesses. But hospitality is a predominant virtue in all quarters, so much so, indeed, that wherever Gregorieffshsky's escort had acquaintances, a whole house, with all belonging to it, was placed at his disposal. He was always preceded by a messenger, and on approaching any spot, was met by some of the inhabitants, who brought him an ox as a present, and greeted him by saying, "This ox is thine, and we hope, will afford you a relishing meal." "Why, my good people," he would reply, "bring me more than I know what to do with? A fowl and some eggs would suit me far better." To this they would laconically rejoin, "We intend paying you a visit, and taking our commons with you." The ox was then slain by the elder of the place, and boiled in large kettles in the court of the house. The Ossetes never roast, but invariably boil, their meat. Their mode at meals is singular: the meat is divided among the parties present, according to their rank, the distinction which the family enjoys, or its comparative numbers. This partition is never made without much contention. A man will frequently allege that he has not as much as the size of his household entitles him to receive; and another insists he is entitled to the shins. In the midst of the din, workmen and paupers are heard fuming and fretting their lothness to be put off with the intestines. And then—the savage greediness with which all is devoured! But, no wonder; it may be their fate to fast three or four days afterwards. They never kill game, in order that their powder and lead may be reserved for their next broil with some neighbour.

In the valleys nearest their border, they drink Grusian wine, but in the interior, nothing but brandy, or a kind of beer made from barley. They have distinct vessels for each separate beverage: a small wooden bottle, with a long neck and small aperture, or the hollow end of an ox's horn, for brandy, and an enormously large sheep or bullock's horn, for beer and water; many of them are above a yard long; and they pride themselves upon being able to empty

it at one draught. All this is the very Germans of Tacitus over again.

They are excellent marksmen, and every one of them is armed in the same fashion. A curved or straight sword hangs in front, but on one side, like the Turkish mode of wearing it. A musket and two pistols are slung to long green belts behind their backs. They draw a shirt of iron mail over their vests, and wear a hood of similar material over their heads. A complete suit of mail is, however, a great rarity, and is considered an article of great luxury among the wealthier class; the majority being content with a piece of mail sufficient to cover the bosom, or else merely as a protection to the head. The female, who is obliged to furnish the male with almost every article of clothing, has to supply him even with his boots and mail. A small round shield, which they use when fighting at close quarters, hangs down from the saddle; three or four skins of thick leather are drawn over it, and an iron ring runs round the edge. An iron button or buckle is fixed in the centre; and betwixt this and the edge, a number of concentric rings are nailed down. The whole weight of the shield is from fifteen to twenty pounds. A plate of metal, with a very narrow slit, is fixed on to the gun as a sight. They make their own powder with the sulphur and saltpetre which their own mountains afford; and have so ample a supply of lead, that their bullets are all made of that metal, unlike the Lesghis, whose balls are exclusively of iron.

ON THE CUSTOM OF WEARING RINGS.

II. EAR-RINGS, &c.

1. THE practice of wearing rings from the lower parts of the ear is likewise to be referred for its origin to the days of antiquity. It is still common, in most parts of the world, to bear about these pendent ornaments; but, westward as we go, the custom belongs more to the female sex than to the other, and, in our own country, entirely so.

That the wearing of rings and jewels in the ears, by way of ornament, took its rise in the eastern parts of the world, seems probable, by considering that the ornaments worn by the Jewish women were, in progress of time, very numerous. The prophet Isaiah, when reproaching the daughters of Sion with their luxury and vanity, (chap. iii., 16—24,) gives us a particular account of their ornaments, which, with their idolatry, were most probably derived from their heathen neighbours, among whom they had settled. That this was the case, seems extremely credible by reference to several parts of Scripture, where we read that the spoil of *ear-rings, &c.* was dedicated to the Lord.

This trinket seems to have been worn in those days as well by men as by women. It should seem that this ornament had been heretofore used for idolatrous purposes; since Jacob, in the injunction which he gave to his household, commanded them to put away "the strange gods which were in their hand, and all their *ear-rings*, which were in their ears." (Gen. xxxv. 4.) These ear-rings, or jewels, worn by Jacob's household, had probably been consecrated to superstitious purposes, and worn as a sort of amulet: for we learn that rings, whether on the ears or nose, were first superstitiously worn in honour of false gods, and probably of the sun, whose circular form they might be designed to represent. Rings and vessels, among the heathens, had oftentimes the image of the sun, moon, &c. engraved on them. The prophet Hosea speaks *of the women of* Jerusalem as indulging themselves in the lying vanities of ear-rings devoted to the idol deities.

The ladies of ancient Rome used ear-rings of pearls and of precious stones. They had sometimes three or four to each ear; and they were of immense value. The Moors of Africa were also noted for the use of these ornaments.

Many of the busts of the heathen gods have been found to have ear-rings, or holes pierced in the ears for that purpose. Some investigators of antiquity have considered this to be characteristic of the busts of divinities; but this opinion does not appear to be well-founded, as there are many well-known statues of mortals which have the ears pierced. The fine bust of Caracalla, in the Villa Borghese, which is affixed to a statue of Hercules, has only the *right* ear pierced.

2. Jewels or rings for the nose seem more peculiarly eastern throughout all the ages of the world, than rings for the hands or the ears. These rings, as used by the Jewish women, were set with jewels, and hung from the nostrils, like ear-rings from the ears, by holes bored to receive them. These ornaments, from the allusions made to them in different parts of Scripture, seem not to have been uncommon throughout the various ages of the Jewish state and nation. However singular this custom may appear to us, modern travellers attest its prevalence in the East, among women of all ranks. In the East Indies, a small jewel, in form resembling a rose, adorns one *nostril* of even the poorest Malabar woman.

3. Among the Eastern nations, rings for the feet, called "tinkling ornaments" *about the feet*, by the prophet Isaiah, (chap. iii., 18,) were anciently in general use, as they are likewise in modern times. The East Indian women who accompanied the Indo-Anglican army from India to Egypt, some years ago, wore not only large rings in their noses, but silver rings about their ankles and wrists; their faces being painted above the eye-brows. In Persia and Arabia also, it is well known that the women paint their faces, and wear gold and silver rings about *their ankles*, which rings are full of little bells that tinkle, as they walk or trip along. Cingalese children of ten, wear rings about their ankles; Malabar and Moorish children wear rings, hung about with hollow balls which tinkle as they run.

WHEN on the fragrant sandal tree
The woodman's axe descends,
And she who bloomed so beauteously
Beneath the keen stroke bends,
E'en on the edge that wrought her death,
Dying she breathes her sweetest breath,
As if betokening in her fall
Peace to her foes, and love to all.
How hardly man this lessons learns,
To smile, and bless the hand that spurns;
To see the blow, to feel the pain,
But render only love again.
This spirit not to earth is given;
One had it—but HE came from Heaven.
Reviled, rejected, and betrayed,
No curse He breathed, no plaint He made;
But when in death's deep pang He sighed,
Prayed for His murderers, and died.—EDMESTON.

To make a man virtuous, three things are necessary: 1st. natural parts and disposition; 2nd. precepts and instruction; 3rd. use and practice, which is able better to correct the first, and improve the latter.——LOCKE.

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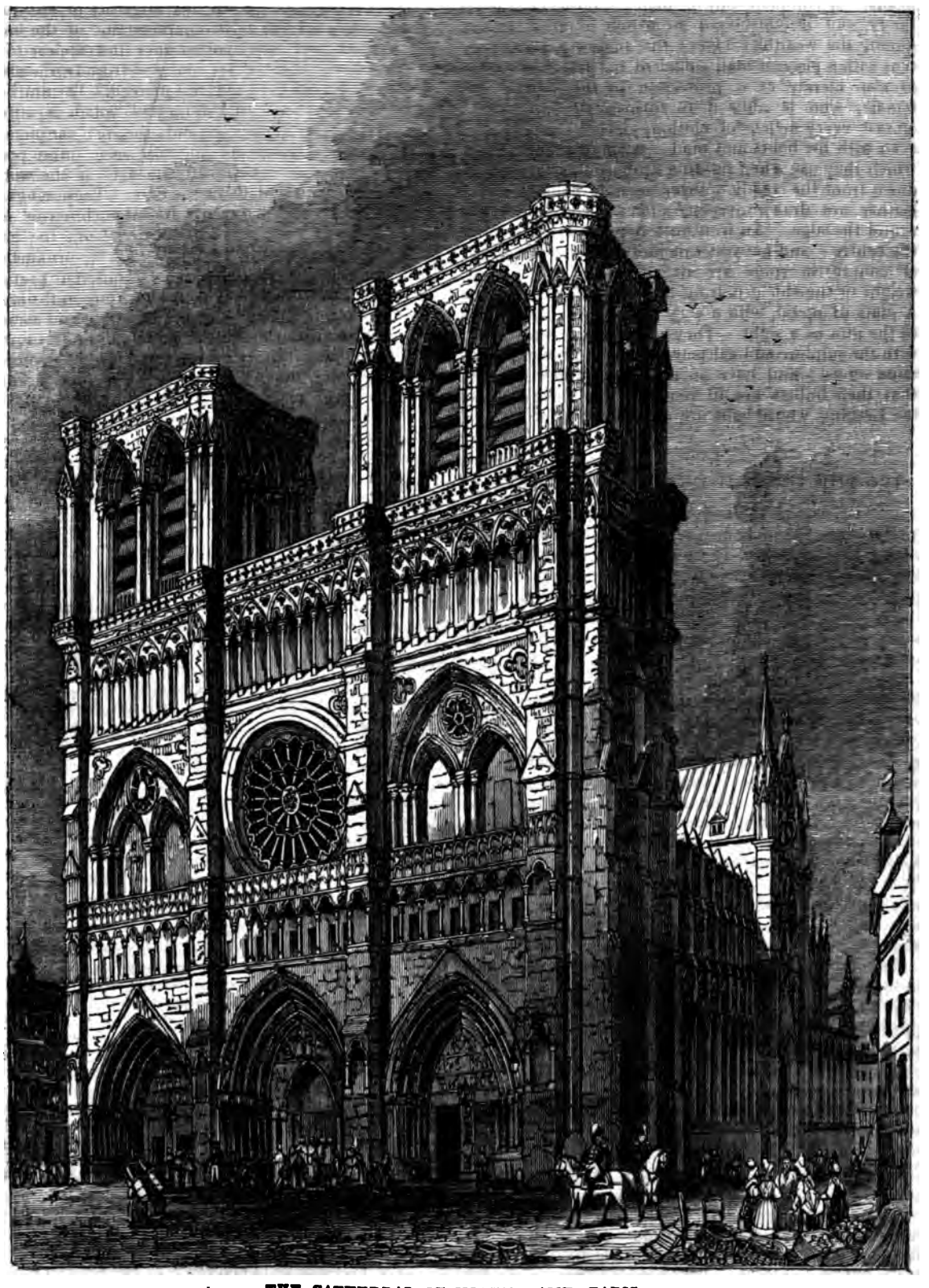

THE CATHEDRAL OF NOTRE DAME, PARIS.

SOME ACCOUNT OF PARIS, HISTORICAL AND DESCRIPTIVE.

PART THE THIRD.

HISTORY OF THE MASSACRE OF ST. BARTHOLOMEW, IN 1572.

THE city of Paris has attained a fearful celebrity on account of the numerous and extensive scenes of slaughter and devastation which cause so many of the pages of its history to be written in characters of blood. Among all these transactions, perhaps the most cruel and heartless is that which is commonly called THE BARTHOLOMEW, or the Massacre of St. Bartholomew's, which was perpetrated on the day of that saint, viz., 24th August, 1572.

The dark and bloody scenes of that terrible day are deeply written in the hearts and memories of Protestants, nor can they view the merciless slaughter of their brethren, committed under the mask of friendship, and preceded by every expression of regard, without feelings of the deepest regret, indignation, and abhorrence. The events which preceded this memorable massacre, and the position of public affairs at the time it took place, can be but briefly described in this place, but some notice of them will be necessary to enable such of our readers as may be unacquainted with the subject, to understand the full atrocity of the transactions of the 24th August.

Protestantism in France, at the time we are speaking of, had not the advantage of being sanctioned or tolerated by the ruling powers. In England, its progress was aided by the civil magistrate, and a sort of compromise was effected between those who had embraced the reformed religion, and the adherents to Popery, but the *Huguenots*, as the French Protestants were called, were very differently circumstanced. Discountenanced, and at length persecuted by the court, they became a separate people, united to each other by the closest bonds of fellowship and religion, but opposed, in principle and practice, to the prevailing religion of their country. Dreadful persecutions of the Protestants had taken place during the reigns of Francis the First, and of his son Henry the Second: pillages, massacres and burnings, every where became the lot of that devoted party.

In 1560, the fires of martyrdom were less frequently lighted up, but civil war began to distract the country. The princes of the House of Bourbon, alarmed at the increasing authority and imperious conduct of the Cardinal of Lorraine and the family of the Guises, sought to fortify themselves against these powerful strangers, by an alliance with numbers of the persecuted Protestants and others, who, on their side, were glad to embrace the protection thus offered them. Though we have previously mentioned the term Huguenot, it was not until this period that it was conferred. It was derived, according to some, from a Swiss term signifying *sworn*, or *bound by an oath*; according to others, it was a contemptuous appellation derived from the smallest coin then in use, which had been first circulated in the time of Hugo Capet. The party opposed to the Huguenots (that is, the Guises, and their uncle the Cardinal of Lorraine,) had the powerful support of the Pope and the court of Rome, and also of the courts of France and Spain, and were called the Popish or Catholic party. Unhappy was it for the poor Protestants that they were thus led to cling for protection to a *party*, and induced to join in the civil strife which followed, and in which the leaders on either side, appear in many cases, to have been actuated by political animosity alone, and to have made a show of their religious differences while they were secretly gratifying their own ambitious views.

Between the years 1560 and 1570, treaties of peace were twice concluded between these rival powers, but were shamelessly broken, as it suited the purpose of the Guise party; and in the latter year, when peace was offered a third time, it is not to be wondered that the Protestants received the proposal with some mistrust, especially as unusual favour was shown to them in the terms of the treaty. It will be necessary, however, to describe the character of the reigning sovereign at this important period. The government of France was nominally in the hands of Charles IX., who, on the death of his elder brother, Francis II., had succeeded to the throne at the early age of ten years. The actual *ruler of the country* was his mother, Catherine de Medicis, widow of Henry II. This woman was ambitious to the highest degree, and impatient of control: her nature was cruel, and she practised the arts of perfidy and dissimulation in such a manner as to show that she was alike unrestrained by religion and humanity. From the time that her son became king, she used all her endeavours to corrupt and enfeeble the mind of her own child, in order that, as he advanced in years, he might, retaining the mere name of king, leave all real power in her hands. In these attempts, she partly succeeded, and at the age of twenty-two, we find the king second only to his wicked parent in treachery, cruelty, and selfishness. He did not possess her resoluteness and inflexibility of purpose, but he was obstinate and wayward; the superior talents of which he had shown some proofs, had been checked and perverted by the evil influences of those around him, and all the vicious parts of his character had expanded and increased with baneful luxuriance. Such were the hands in which supreme authority was vested, and from such an unexpected quarter did the Protestants now receive advantageous offers of peace. Tired of civil war and its miseries, the Protestant leaders accepted the conditions proposed to them, and a peace, afterwards called *la paix boiteuse*, the lame peace, was concluded between the parties. The principal leader of the Protestants, at that time, was Gaspard de Coligny, Lord of Châtillon, and admiral of France. He was a brave and virtuous man, grave in his manners, upright in his intentions, cool and collected in danger, and displaying the greatness of his character more especially in the time of adversity and distress. The chiefs of highest rank were the two young princes, Henry, king of Navarre, (afterwards Henry IV.,) and the Prince of Condé, who had sworn to avenge the death of his father, who had been assassinated by the opposite party.

The Catholic and Protestant leaders, far from being reconciled or united by the false peace which existed between them, were ever on the watch, and mistrustful of each other. But it was not Catherine's purpose to keep up the fears of Protestants, for whom she had now begun to lay her deep and dreadful snare. It appears tolerably certain that as early as the year 1565, this treacherous woman had projected the "deliverance of the kingdom from the Protestant party," and that a council was held at Bayonne for the express purpose of forwarding such views, where the French, Spanish, and Papal powers came to an understanding on the subject of the massacre, which circumstances did not put in their power till seven years afterwards. Hints on the subject of that iniquitous conference accidentally escaped, and the Protestants were for awhile on their guard, but several years of comparative tranquillity having elapsed, they were lulled into a false security, by a series of the most artful devices, and at length the sincerity of the royal family seemed placed beyond all question by the proposal of Catherine to give her daughter, the sister of the reigning king, in marriage to the young protestant Prince of Navarre. The Queen of Navarre, with the young prince Henry, arrived at court to conclude the treaty, and met with the most flattering reception. The honourable and respectful treatment of them by the king, excited the surprise of every one.

After one of these scenes of dissimulation, we are told by Sully and other writers that Charles, on quitting the Queen of Navarre, said to his mother, "What do you think of me; do I not play my part well?" The queen, pleased with the duplicity of her son, replied, "Yes, very well, but to commence is nothing unless you go through with it." "Let me alone," said Charles, "and I will net them every one for you."

The court, which had hitherto been stationed at Blois, came to Paris to prepare for the approaching marriage. On the 9th of June, 1572, the Queen of Navarre died suddenly, and though it was given out that her death was caused by over-fatigue in preparing for the nuptials of her son and Margaret de Valois, it is generally believed that

poison was administered to her by an agent of Catherine de Medicis. The Queen of Navarre was a woman of sense and penetration, and it is thought that Catherine dreaded her discovery and subversion of the schemes which were now so deeply laid for the entrapping of the Protestant party. This event, concerning which there was sufficient mystery to have excited the suspicions of Coligny, had he been at all distrustful of the intentions of the court, was not allowed to shake the confidence of the good admiral, and, blinded by the flatteries and protestations of Catherine and her son, he remained in fancied security to be present at the marriage of the young prince. Invitations were sent to all the distinguished Huguenot lords and gentlemen in France, to repair to Paris on this occasion, and, encouraged by the example of their admired leader, the greater part of their number hesitated not to obey the summons.

Meanwhile, the Cardinal of Lorraine, who feared for the safety of his person, should the plot be unsuccessful, quitted the court of France and repaired to Rome, leaving Cardinal Pelvé to transmit to him every particular of the progress of the conspiracy. It is said that some of these letters were intercepted and laid before Coligny, but that his noble mind rejected with abhorrence the idea of so much treachery on the part of Catherine and the king. The more he was entreated by the Protestant chiefs to be on his guard, the more indignantly did he repel all doubts of the king's sincerity. In order to maintain the confidence of the admiral, Charles and Catherine redoubled their arts. The Guise party affected to be jealous of the regard shown for Coligny, and their jealousies and threats to retire from court were related to the Protestants.

At length a letter, purporting to be from Rome, announced that, through the exertions of the Cardinal of Lorraine, the difficulties which had arisen concerning the projected marriage were overcome, and that a dispensation from the Pope would speedily be granted. The preparations were then hastened, the young Prince of Condé, with a number of Protestant noblemen, arrived in Paris, and the eighteenth of August was fixed on for the celebration of the nuptials. On the evening of the seventeenth, the espousals of the royal pair were celebrated in the Louvre with great festivity, and on the following morning the marriage took place with great pomp and splendour, the ceremony being performed on an elevated platform in front of the fine cathedral of Notre Dame, in the presence of a vast assemblage both of Catholics and Protestants. For four days following nothing was heard of but balls, masquerades, splendid banquets, &c.

One of these entertainments was of so remarkable a description that we cannot but give some account of it. It took place on the 20th of August, at the Hôtel de Bourbon, and was in fact a theatrical representation of the horrible tragedy about to be enacted. King Charles and his two brothers, personated knights in complete armour, who defended the entrance to the Elysian fields, where beautiful verdure and flowers, and nymphs richly arrayed, invited the attention of troops of knights errant, advancing from the opposite side of the stage. These knights, also, were arrayed in complete armour, and wore various liveries, but they were not able to reach the gardens without passing a river which separated them from it. On this river was a boat guided by Charon. In their attempt to reach the Elysian shore, they were hindered by the three knights, who, having broken their lances against the assailants and struck them with their swords, drove them back towards a place which represented the infernal regions of the heathen mythology, where fiends waited to drag them down the abyss. Thus every troop of knights was overcome and driven into Tartarus, where they were finally shut in, and the gates made fast. The meaning of this allegory became too evident, and the flatterers in court afterwards complimented the king on having chased the Huguenots into hell.

This strange pastime, together with various secret intimations of danger received by the Protestants, at length aroused their fears; and these fears were suddenly augmented by the arrival of a body of 1200 soldiers in Paris, who took up their stations in the vicinity of the palace and arsenal. Several Protestant noblemen secretly left Paris, and Coligny himself was induced to seek an explanation. The king assured the admiral that the troops had been ordered thither for the express purpose of protecting the Huguenots themselves against the rancour of the Guise party. Thus easily were they lulled into security, for which a Popish writer proposes to account by the supposition, that *God, in order to ensure their destruction, had smitten them with judicial blindness!*

On Friday, the 22nd of August, Coligny after having attended a council at the Louvre, departed for his residence in the Rue Béthizy. On the way, he met the king coming from a chapel in front of the palace, and accompanied his majesty to a neighbouring tennis-court, where Charles and the Duke of Guise played against Téligny and another Huguenot gentleman. After a short stay, the admiral withdrew, and attended by twelve gentlemen, proceeded homewards to dinner, a meal which was then taken at the early hour of eleven in the forenoon. He walked slowly through the Rue des Fossés St. Germain l'Auxerrois, reading a paper which had just been presented to him, and as he came opposite to the house of a canon named Villemur, who had formerly been preceptor to the Duke of Guise, an arquebuss was discharged from a trellised window in it, and he was struck by two balls, one of which carried away the fore finger of his right hand, while the other inflicted a severe wound on his left arm. Coligny retained his composure sufficiently to point out to his attendants whence the shot had been fired, and to direct one of them to go and acquaint the king with what had happened; others supported him home, while the rest of his followers quickly made their way into the house, and ascended to the chamber in which the assassin had stationed himself. The arquebuss was there resting on the window, but Maurevert himself (for it was he who had fired it,) had escaped through a back-door opening into the cloister of the church of St. Germain l'Auxerrois, and was riding at full speed out of the city by the gate of St. Antoine. The king was still playing in the tennis-court when the news of this outrage, perpetrated in its immediate vicinity, reached him. He instantly threw down his racket, exclaiming with an air of consternation:—"Shall I never have peace? What! always fresh troubles!" and retired into the Louvre. The Duke of Guise took his departure in another direction.

Coligny having been carried home and put to bed, was speedily visited by the King of Navarre and the Prince of Condé; for the news spread rapidly, and excited a great sensation among the Protestants. The celebrated surgeon, Ambroise Paré, attended, and advised an amputation of the thumb; but the operation being performed unskilfully, caused the patient a great deal of pain. When his arm was being dressed, the admiral secretly ordered a hundred crowns of gold to be delivered to the minister Merlin, for distribution among the poor; and throughout this trial, he showed "much resignation, courage, and devotion to the religion which he professed." His wounds were declared on the following day not to be dangerous.

After a short stay in the admiral's chamber, the King of Navarre and the Prince of Condé repaired to the king's presence, and complained of the atrocious attempt, beseeching his majesty to permit them to depart from Paris, since neither they nor their friends could remain there in safety. The queen-mother had just told her son, "that it was necessary to promise justice, and take care that no one departed, and they would afterwards consider the rest." Charles accordingly replied, with his usual oaths, that the authors and abettors of the outrage should be subjected to exemplary punishment; and begged the young princes not to quit the court, in order that they might be witnesses of his diligence in pursuing the guilty. The queen-mother spoke in the same strain; "a great outrage," she said, "had been committed against the king, and if such a crime went unpunished, neither the person of his majesty, nor her own, would be safe from similar attempts in their very palace." Orders were immediately given to the Provost of Paris, for pursuing the assassin and his accomplices, and for shutting all the city gates except two.

Soon afterwards, Téligny brought a request that his majesty would visit Coligny, as he had a communication to make. Accordingly, about two o'clock in the afternoon, the king set out from the Louvre for Coligny's hotel, accompanied by the queen-mother, his brothers, and a large retinue of courtiers; taking a route which avoided the scene of the outrage, where a crowd was assembled, gazing upon the admiral's blood. "The wound is your's, the pain is mine," said the king to Coligny, on being introduced into his chamber; and then, with his customary imprecations, he added: "I will take so terrible a vengeance that never shall it be effaced from the memory of man." Charles and his mother approached the admiral's bedside, and a conversation ensued in a low tone of voice

Coligny afterwards complained that the last treaty of pacification had been violated. The king answered that his greatest desire was to maintain the treaty. "I have sent commissioners," he said, "charged to execute it rigorously; here is my mother, who can bear witness to it."—"That is true," observed Catherine, "and you know it well."—"Yes," replied Coligny, "but among those commissioners there are some who have condemned me to be hanged, and have offered a reward of 50,000 crowns to any one who should bring you my head."—"Well, then," rejoined the king, "we will send others who shall not be suspected by you;" and then, with an apparent wish to evade further explanation upon the subject, he added: "My father, you heat yourself too much, it will injure your health."

A part of the conversation seems to have been held, at Coligny's request, between himself and the king alone; Charles commanding his mother and his brother to retire to a distance. Catherine afterwards confessed, that these were the most painful moments of her life: "Her consciousness of guilt, the interest with which Charles listened to the admiral, the crowds of armed men in constant motion through the house, their looks and whispers, and gestures, all conspired to fill her with terror." Unable to remain any longer in such a situation, she interrupted the conference, by pretending that silence and repose were necessary for the recovery of the admiral.

In the course of the same day, the Protestants held a meeting at which the late attempt upon the admiral's life formed the principal topic. "It is the first act of a tragedy which will end with the murder of us all," said Jean de Ferrières; "let us quit the city as soon as possible." But the young and generous Téligny indignantly repelled all suspicions of the king's good faith; and succeeded in impressing his own feelings of confidence upon the bulk of the assembly.

The chiefs of the conspiracy held a meeting to decide the extent of the massacre, and whether the King of Navarre and the Prince of Condé should be comprised in it. Among the conspirators present were the queen-mother, the Duke of Anjou, the Duke of Nevers, Cardinal Birague, Marshal Tavannes, and the Count de Retz; whether Charles himself was there, is considered by some to be a matter of doubt. According to his own statement, as reported by his sister Margaret, in her *Memoirs*, he was visited about the middle of the day, in his chamber, by his mother, who was soon followed by the Duke of Anjou and other lords of the Catholic party; and then he was suddenly informed that the Protestants were engaged in a conspiracy; that Coligny and his friends were plotting his destruction, and that if he failed to anticipate them, and waited till the next morning, he and his family would be the victims of their designs. Influenced by this representation, he gave, he says, a reluctant and hurried consent to the proposals of his counsellors, exclaiming as he left the room, "that he hoped not a single Huguenot would be left alive to reproach him with the deed."

The measures adopted in the course of the day, for the execution of the detestable plot, seem to have been intended at the same time to allay the suspicions of the Protestants, and to ensure their destruction. The king sent several gentlemen to visit Coligny on his part; he even sent his sister Margaret, the newly married Queen of Navarre, on the same mission. He ordered the necessary process to be commenced against those who had attempted the life of the admiral, and he received the Duke of Guise very coldly in public. Under pretence of giving the Protestants guards to protect them from the Guises, of whom Charles affected to entertain apprehensions, the municipal officers of the different quarters of the city were sent to all the houses in which they dwelt, with orders to write down the name and residence of each of them. Permission had been given to the Protestant lords and gentlemen to take up their abode in the admiral's quarter, that they might enjoy the protection of the guard assigned to him; a large number availed themselves of it, and for their accommodation, the Catholic inhabitants were obliged to give up their houses. Fifty soldiers were stationed around the hotel of Coligny; but the pretext of ensuring his safety received an ominous contradiction from the fact that they were commanded by the Sieur de Cosseins, a creature of the queen-mother, and a sworn enemy of the admiral.

The evening of Saturday, the 23rd, brought with it some alarming indications; specious explanations were given, and the suspicions of the Protestants were still lulled by their reliance on the royal word. Bands of armed men were gathering in the neighbourhood of the Louvre; "It is the Guises stirring up the people," said the king, "I will settle it." The alarmed Protestants ventured to complain that a number of porters were engaged in carrying arms into the Louvre. The king's answer was ready; those arms were required for an entertainment about to be given in the palace, in which was the representation of a besieged fortress. It had been determined by the conspirators, that the lives of the King of Navarre and the Prince of Condé should be spared; this decision has been variously attributed to the suggestion of the Duke of Nevers, the Count de Retz, and the Marshal de Tavannes. In the *Memoirs* of the Marshal, written by his son, we are told, that "to his single advice, and to his single voice, the great king Henry and the Prince of Condé, owed their lives;" and that it was unfortunate for the Marshal's posterity that his majesty did not know the truth upon that point. However, as the time approached for the execution of the plot, the young princes were treated with much apparent kindness by the king, who affected to fear that the Guises might make an attempt upon their lives, and requested them, for their better security, to introduce their principal officers and gentlemen into the Louvre that night, and station them around their own apartments. The request was complied with; and by ten o'clock on the night of Saturday, the princes had retired to their chambers unsuspicious of the coming storm.

During the night, the Duke of Guise was chosen to be the chief director of the horrible enterprise. He stationed the Swiss troops and some French companies around the Louvre, with strict orders, not to permit the departure of a single servant of the King of Navarre or the Prince of Condé; and similar instructions were forwarded to Cosseins at the hotel of Coligny. Detachments of military were likewise stationed along the bank of the river and in various streets; and the Provost of the Merchants was commanded to direct the captains of the different quarters to arm their companies, and to repair towards midnight to the Hôtel-de-Ville. The city had been parcelled out among the chiefs of the conspiracy, each of them having assigned to him a quarter in which he was to direct the massacre; the Duke of Guise reserved for himself that in which the admiral resided. The houses of the Protestants had been marked with white crosses; the perpetrators of the massacre were to be distinguished by white scarfs around their left arms and white crosses in their hats.

As the hour drew nigh for striking the fatal blow, Catherine felt apprehensive lest her son's resolution *might fail* him. She repaired to his chamber, and held a long conference with him; but finding him still hesitate, she reproached him with suffering the opportunity to escape which *God offered him*, of triumphing over his enemies. This imputation of pusillanimity determined his wavering mind; and he rashly consented to all that his mother required. It had been originally agreed, upon the advice of the Marshal de Tavannes, that the massacre should not begin before day-break, or between two and three o'clock in the morning, lest the darkness should facilitate the escape of any of the intended victims. Catherine wished the work of slaughter to be complete; but knowing the vacillating temperament of her son, she was anxious to secure his assent as soon as possible, and then take steps to render it irrevocable. Everything was in readiness; the armed citizens had been assembled at the Hôtel de Ville, and harangued by Marcel, the late provost of the merchants, who explained to them the intentions of the court, and the necessity for the sanguinary measures about to be adopted.

Some of the Protestants dwelling in the admiral's neighbourhood, were awakened by the noise and bustle naturally incident to the execution of so great a plot; and upon going to the Louvre, to inquire of the sentinels the reason of the extraordinary movements, they were insulted and repulsed. One of them, complaining of this treatment, was killed by a Gascon soldier, with the blow of a partizan; and the others were immediately slain. The impatient Catherine availed herself of this opportunity. "It is no longer possible to restrain the ardour of the troops," she said to her son; "disorders will ensue, of which we shall have cause to repent,—it is time to give the signal." The king then gave the fatal order for sounding the tocsin from the neighbouring church of St. Germain l'Auxerrois.

Soon after two o'clock on the morning of Sunday, the 24th of August, 1572, the day on which the Catholics celebrate the annual festival of St. Bartholomew, the memorable massacre, which has derived its appellation from the name of that holiday, commenced in the quarters contiguous

to the royal palace of the Louvre. Cosseins was at his post before the admiral's hotel, in the Rue de Béthizy, anxiously awaiting the preconcerted signal, when the light of the dawn discovered to him the approach of the Duke of Guise, at the head of an armed body, and announced to him that the moment for action had arrived. Placing soldiers opposite to the windows, to cut off all escape in that quarter, he knocked loudly at the gate, and demanded admission in the king's name. One of Coligny's gentlemen came down, and opened it: Cosseins instantly despatched him with a dagger, and, followed by his men, entered the court-yard, where the attendants who presented themselves were slain on the spot. The inmates of the house were speedily aroused; but the admiral and his friends resigned themselves to a fate which they saw was inevitable; and, asking pardon of God, prepared to meet it with tranquillity. A gentleman of the household entered the chamber, and, in reply to an inquiry from the surgeon, Ambroise Paré, concerning the cause of the tumult, turned towards Coligny, and addressed him in these words, "Monseigneur, God calls us to himself; the house is forced, and there are no means of resistance." The admiral calmly answered: "I have long been prepared to die; as for you, save yourselves if it be possible, for you cannot protect my life." Several availed themselves of this permission, and endeavoured to escape by passing over the roof; but only a few succeeded in thus saving their lives.

After an ineffectual attempt to barricade the entrance of the house, and to arrest the murderers on the staircase, the door of the admiral's room was forced. A German, named Besme, a Picard captain, named Attin, and several others, all in the pay and employ of the Guises, all covered with cuirasses, and armed with swords and daggers, entered the chamber. Besme advanced towards Coligny, who had but recently arisen from bed, and was still in his night-dress, and placing the point of a sword at his throat, said to him, "Are you not the admiral?"—"I am," replied Coligny, firmly; and then looking calmly upon the sword which threatened him he added, "young man you ought to respect my old age and my infirmities, but you shorten my life only by a few days." Besme plunged the sword into his breast, and drawing it out again, struck him with it several times in the face. The details of this horrid scene were afterwards furnished by the murderers themselves, and particularly by the Picard captain Attin, who declared that he never saw a man with death before his eyes face it with such firmness as the admiral did. His assassins were indeed astonished at his noble demeanour; and Attin said that for a long time he retained an impression of the terror with which he was inspired by the imposing figure of the old man, at the moment of his death.

While these things were passing above, the Duke of Guise, with several other Catholic lords, remained in the court below. Impatient to learn the catastrophe, he at last exclaimed, "Besme, have you finished?" The assassin replied, "It is done." The duke rejoined, "Monsieur d'Angoulême will not believe it unless he sees it with his own eyes; throw the body out of the window." Accordingly, Besme and another lifted up the admiral's body, and let it fall into the court. The face was so disfigured with wounds and blood, that d'Angoulême and Guise doubted if it was Coligny; but having wiped it with a handkerchief, Guise observed, "It is indeed he," and after he had trodden the head under his feet they remounted their horses and departed. The duke, then addressing his men, cried out, "Courage, soldiers, we have begun well; let us go to the others, for the king commands it." He repeated incessantly the words, "The king commands it—it is by his express command—such is his will."

After this dreadful deed, the tocsin from the palace responded to that of St. Germain l'Auxerrois, and the streets resounded with the cry "To arms." The Duke of Guise and his party rode through the city, sword in hand, exciting the people to the massacre; and the better to effect their purpose, they affirmed that Coligny and the Huguenots had conspired against the life of the king and of the princes, that the conspiracy had just come to light, and that the friends of the throne must unite to destroy this impious race, the king being determined to crush and destroy those serpents the heretics. Thus excited and authorized, the people flew to the massacre, and gave way to every species of excess, without fear or remorse—one party rushed to Coligny's dwelling, insulted and mutilated his corpse, and having dragged it through the streets of the city, were about to throw it into the Seine, when it was suggested to carry it to the gibbet at Montfauçon, where they accordingly conveyed it, and suspended it by the thighs with iron chains. The head was embalmed by order of the court and sent, it is said, to Rome as a trophy of the victory.

We are told by a writer of that period, that the queen-mother went to feast her eyes with the sight of poor Coligny's maimed body, as it hung on the gibbet at Montfauçon, taking with her, her sons, her daughter, and her son-in-law. The generous and too-confiding Téligny had been one of the first to suffer: he was slain at Coligny's house, by the guards of the Duke of Anjou. The streets of Paris on that dreadful Sabbath morning, presented a most horrible scene of pillage, massacre, and blood, and the air resounded with mingled cries of savage triumph, and of agony and death. Not even the Louvre itself was free from these scenes, nor did the hapless victims find any mercy when they threw themselves on the compassion of the king. Nancey, captain of the guard, went with a body of soldiers into the apartments of the King of Navarre and the Prince of Condé, deprived of their arms all the servants and gentlemen attached to the suite of these princes, and forced them from their sleeping apartments to the gate of the Louvre. Here, their Swiss executioners were waiting to despatch them, and when the unhappy gentlemen began to remind the soldiers that they had the king's promise of protection, Charles himself appeared at one of the windows of the Louvre, charging the executioners to do their office, and spare no one. During the whole of that morning, the massacre went on in the royal palace. One of the wretched Protestants rushed into the sleeping apartment of the young Queen of Navarre, and wounded and bleeding as he was, threw his arms around her and besought her protection. The young queen, though terrified and fainting, begged his life, and it was granted to her intercessions. Early in the morning, Charles posted himself at a window looking towards the Seine, and aimed with carbines at such of the fugitives, as having escaped the poignard, were attempting to save their lives by swimming across the river. The same morning he sent for the young King of Navarre and the Prince of Condé, and, while he endeavoured to justify the massacres, as well as the assassination of Coligny, promised to spare and pardon them, on condition of their renouncing the Protestant faith, and embracing Popery, and on that condition alone. The King of Navarre, amazed at such a proposition, reminded his brother-in-law of the promises and oaths made at the time of the marriage, of the difficulty of giving up the religion in which he had been brought up, &c., but at the same time conceded to most of the king's wishes. The Prince of Condé spoke more boldly, and with greater energy and indignation; so much so, as to irritate and enrage the king, who loaded him with oaths and threats, and gave him three days only, to consider whether he would renounce his faith, or lose his head. Both princes yielded to the pressing necessity.

Meanwhile, in the city, numbers of persons who had received protestations of friendship from the king on the preceding day, were suffering the penalty of their repose in royal promises. La Rochefoucauld who had been spending the evening of Saturday at the palace, and to whom Charles had jokingly said, when at eleven o'clock his visitor departed, "that he would come and give him the whip in the night," was awakened by masked assassins and stabbed to the heart by one of them named La Barge. Brion, the tutor to the Prince of Condé, in spite of the tears and entreaties of his pupil, was slain in his arms. Pierre de la Place gave three thousand crowns to the chief executioner, in the hope of escaping the general doom. He was seized in his own house, and ordered immediately to repair to the Louvre. His unhappy wife threw herself at the feet of the officer, and besought mercy with many tears. La Place raised her, and, reproving her for the humiliating posture she had assumed, bade her adieu, and tearing from his child's cap a cross which he had previously placed there to preserve it from the murderers, he courageously followed the soldiers. Before he reached the Louvre, five or six assassins fell upon him and poignarded him. A celebrated Professor of that time, Ramus, who had done much for the advancement of literature and mathematical science, but who was also an opponent of the religion and the philosophy of that day, was first induced to give a large ransom for his life, and then assassinated in the college of Presles. Very few were found to offer resistance to the murderers. A lieutenant named Tavernay is distinguished, as having, with the single aid of his servant, kept [illegible]

enemies at bay for eight or nine hours. Having exhausted all his ammunition, he was at length overcome, and fell beneath the weapons of the murderers, after having destroyed many who opposed him. François Nompar de Caumont, who, with his two sons, had been lodged in the vicinity of the Louvre, fell beneath the assassins' steel, with one of his children. The other, scarcely twelve years of age, escaped the fury of the murderers. Lying on the ground, and bathed in the blood of his father and brother, he was supposed to be dead, and in this situation, the child remained a whole day without moving, till in the evening he heard some of those who entered the house, bewailing the fate of this murdered family, and saying, that God would not surely leave unpunished so dreadful a crime. Encouraged by these words, the boy raised his head, and attracted the attention of these benevolent persons. They asked his name, but he was prudent enough to reply, "I am the son of one of these dead persons, and the brother of the other." When they still further pressed to know who he was, he said, "that he would tell them as soon as they had taken him to a place of safety. Let me be taken to the arsenal," said he, "I am related to Biron, the master of the artillery, and you will be rewarded for your trouble." They took him there with all the necessary precautions, and the child was saved.

But how great was the number of those who were not equally fortunate! It would be impossible to relate even a small portion of the events of that and of the two succeeding days; but, as some relief to our painful narrative, we may mention the escape of a party of Protestants, lodged in the Faubourg St. Germain, among whom were the Count of Montgomery, the Vidame of Chartres, the Sieur de Fontenay, and others. Being informed of the tumult in the city, they felt so persuaded that it must have originated with the Guise party, and that not only was the king innocent of any ill intent towards the Protestants, but that he must be himself in danger from this sudden disturbance, that they were actually on their road to the Louvre, to offer their assistance to his majesty, when, as they were stepping into the boats which were to convey them across the river, they beheld about two hundred soldiers of the king's guard advancing on the opposite side, and the king himself stationed at the window of the Hotel de Bourbon, firing as fast as guns could be handed to him, and encouraging the men below to proceed with their work of destruction. At this sight the Protestants lost not a moment in making their escape, and some on foot, some on horseback, contrived to elude their pursuers, leaving, however, their homes and families to pillage and massacre.

De Thou reckons the number of Protestants slain in Paris alone, on St. Bartholomew's day, at two thousand, and other writers tell us that ten thousand were killed during the three days more particularly set apart for massacre in that city. The river Seine was laden with corpses, and no fewer than eleven hundred bodies were cast ashore in the neighbourhood of St. Cloud, Anteuil, and Chaillot. The bodies were not all removed from the streets of Paris for more than a month, and even at the distance of a year from the time of the massacre, they were frequently discovered on the roofs of houses, in cellars, and other remote places. The total number of those who were slain throughout the kingdom, has been estimated by De Thou at 30,000, but there are other historians who believe it to have amounted to 100,000.

At about five o'clock in the evening, proclamation was made by the sound of a trumpet in the king's name, that all the citizens were to retire to their homes; this order, however, was not sufficient wholly to restrain the people from continuing the massacre. On the following morning (Monday) they returned to their work with fresh vigour, and it is said that the slaughter was as great as on the preceding day. Tuesday was scarcely less dreadful, and throughout the remaining days of the month and the early part of September, the Protestants were gradually traced to all their hiding places, and entirely exterminated. It has been very much questioned, whether Charles was at first so active in this dreadful affair as he is represented to have been, or whether he was at all aware of the extent of those proceedings in which he was persuaded by Catherine to take the first step. Whatever may have been his reluctance to *commence* the attack on the Protestants, (and this supposition is very contradictory to some of the accounts of his duplicity towards them, related above,) there *can be no question* as to his enjoyment of, and participation *in, the scene of blood* which followed. We must disbelieve nearly all the historians of the period if we exculpate him from a large share in the cruelties of that memorable time. Not to speak of his visit to the gibbet of the faithful and too-credulous Coligny, and the expression he made use of, that "The body of a dead enemy always smells sweet," nor of his incitement of the people with oaths and exclamations to hasten their work, aiding with his own hand in the slaughter, we have an unanswerable proof of the delight he took in the sufferings of the Protestants, in his conduct towards Cavagnes, a councillor of the parliament of Toulouse, and Brique-maut, a retired military officer of rank, who had been thrown into prison during the massacre, and were reserved for greater sufferings at the king's pleasure. It was the aim and object of the court to persuade people generally that the massacre had been perpetrated merely in self-defence, inasmuch as a conspiracy on the part of the Huguenots for the murder of the royal family had been on the eve of breaking out at the time when Coligny and his party were thus suddenly overpowered and destroyed. That they might obtain something confirmatory of this assertion, Catherine and her son caused a strict search to be made among Coligny's papers, and this having failed, they brought forward the two prisoners before mentioned, and accused them of being concerned in the treason for which the admiral suffered death. Not the slightest shadow of evidence could be found to criminate these gentlemen beyond the bare assertions of those who were procured to accuse them, and the judges accordingly declared their innocence. Another tribunal was then found, and an unsuccessful attempt made to allure the venerable prisoners (for they were both advanced in years) to confess themselves guilty by a promise that their lives should be saved. Finding them to remain firm, and to be proof *against all the* arts employed against them, the court pronounced sentence of death on them, and the confiscation of their goods. Although Charles had been intimately acquainted with these unhappy men, and had shown them many marks of favour and regard, he nevertheless indulged his savage disposition with the sight of their dying agonies. For this purpose he repaired early in the evening to the Hotel de Ville, with his mother and some chosen guests, and partook of a sumptuous repast, while the gray-haired prisoners sat bound together on hurdles, (in which state they had been previously dragged from their prison to this, the place of execution,) waiting for the conclusion of the royal banquet, and exposed to all the indignities which a brutal populace could heap upon them. At ten o'clock the windows were thrown open, and Charles, and his mother and brothers, came forward to view, by the blaze of many torches, the last agonies of their former friends. Nor did they shrink from the dreadful spectacle, but looked on with fixed attention and apparent satisfaction.

The conduct of the queen-mother and of the court, after the perpetration of this horrible crime, shows that they had not sufficiently calculated its consequences, and that they were filled with apprehensions lest a just vengeance should overtake them. They at first endeavoured to excuse their conduct by accusing the Huguenots of treasonable intentions, then they laid the blame on the Guises, and Charles wrote to all the provincial governors, assuring them that the disorder had commenced without his knowledge or sanction, and that the Guises, having been informed of the intention of the friends and relations of Coligny to avenge the wounds which the admiral had received, had raised all the citizens against them in order to prevent it. Then two days after, (August 26,) the king, in contradiction to all this, called in religion to excuse his crimes, *and after* hearing a solemn mass at Notre Dame, went *and formally* declared before the parliament that he had himself commanded the massacre to take place, in order to put a stop to the conspiracies of the Protestant rebels. On the same day he published an edict, in which he declared himself anew the "sole author of the massacres," but in which he placed the Protestants under the protection of the law, and commanded that so long as they lived in peace, no further injury should be done to their persons or their property. What he commanded in public, however, he counter-ordered in private, as the destruction of individuals and appropriation of their property went on as before under the very eyes of the king at Paris, and with his knowledge in nearly all the towns of France.

The court was now greatly harassed by fears of the ambition of the Guises, and of the vengeance of the Montmorencis, and of all the Protestants. The vacillation displayed in its edicts were sufficient to prove its weakness

and its fears. After the solemn declaration of the king just related, the parliament began its proceedings against the memory of Coligny, and of his slaughtered party, and *condemned them to suffer death.* This absurd trial appears to have been carried on through fear of the Guises, and to give countenance to their late conduct, and some few of the Protestants yet living were brought forward to share in the sentence, and to suffer its infliction.

Instead of ridding the kingdom of those who were enemies to the public peace, Catherine soon found that she had increased her enemies ten-fold by the late massacre. Notwithstanding that the number of Protestants throughout the kingdom was greatly diminished, and that in Paris they were nearly exterminated, yet they never gave her so much cause for apprehension as now, when the popular feeling was beginning to turn towards the oppressed party. Civil wars harassed the kingdom, and private animosity, vengeance, and fanaticism, conspired to render them more dreadful than ever. The authority of the queen and her son was despised and disregarded, and Catherine saw herself obliged to solicit peace at the hands of those whom she had formerly oppressed and condemned.

In the year following that of the massacre, the Duke of Anjou, brother to Charles IX., met with a severe reproof for his share in the crime, in crossing the Palatinate, in his journey to Poland, of which country he had been chosen king. He was conducted into an apartment of the elector's palace, where the portrait of Coligny occupied a conspicuous situation. The elector pointed to it, and inquired if the original had not been well known to him. On the duke's reply in the affirmative, the elector paid his tribute to the memory of the admiral in the following terms: "He was the best man, and the wisest and greatest captain in Europe; and I have taken charge of his children, lest the French dogs should tear them in pieces, as they have done their father."

The duke received this cutting reproof in silence, and felt himself little at ease in the palace, especially when he observed that the attendants who surrounded him were principally gentlemen who had escaped the poignard, in that massacre in which he had himself taken an active part. Setting out as quickly as possible from the Palatinate, where he met with nothing but reproach, and where he could not feel himself to be free from danger, he arrived in Poland. But here he had need of all the address he could command, to pacify the people, who, having learnt that he was an accomplice with his mother and brother, were disposed to reject him with horror from being king. By means of written apologies and explanations, little in accordance with truth, he at length succeeded in allaying their resentment, and dissuading them from their purpose. The same indignation was shown at the crimes of the French court by the German princes, and by nearly all the sovereigns of Europe. The court of Rome and the king of Spain alone made those crimes a matter of rejoicing; nor can we wonder at the circumstance, since they are allowed to have taken counsel with Catherine, on the best means of ridding the kingdom of the Protestants, and must naturally have participated in her joy at the accomplishment of their wishes. The Pope was made acquainted, on the 6th of September, with the execution of the Parisian massacre, and the letters of his French minister, which were read in a full assemblage of cardinals, conveyed the intelligence, that everything had been done by the *express order of the king.* At this news the joy of the court of Rome was beyond all bounds; religious ceremonies were appointed, to thank God for the success of the plot, solemn masses were celebrated, a jubilee published, cannons fired, bonfires lighted in the streets, and grand processions formed, in which the Pope, the cardinals, ambassadors, priests, and soldiers assisted. The Cardinal of Lorraine exhibited the greatest pleasure on the occasion; he gave three thousand crowns in gold to the gentlemen who had been dispatched by his brother, the Duke d'Aumale, to bear him the joyful tidings. He celebrated mass with great pomp and display after the procession was over. They placed an inscription on the church, signifying that the Cardinal of Lorraine, in the name of the Christian King Charles IX., returned thanks to God, and congratulated "our holy i... the Pope, Gregory XIII., the sacred college of cardinals, &c., on the wonderful and incredible success which had attended *the counsels given and the aid afforded by the Holy See,* and the prayers which had been offered up, by the appointment of his Holiness, for twelve years past;"—thus avowing, as openly as it was possible to do, the participation of the court of Rome in the extermination of Protestants. In order to perpetuate the memory of the triumph, the Pope caused a medal to be struck, bearing on one side this inscription, UGONOTTORUM STRAGES, 1572, and on the other, GREGORIUS XIII. PONT. MAX. AN. II. Misson, in his *Travels in Italy,* mentions having seen this medal, and Sir William Cockburn, of Bath, has one of them in his possession, a lithographic copy of which he has placed as a frontispiece to his History of this atrocious Massacre*. From this print we have borrowed our representation of the medal given on the following page, and we are further indebted to the Baronet's well-timed volume for many of the particulars which form the substance of this paper.

The King of Spain too appears to have played no mean part in the tragedy we have been describing. He furnished a portion of the funds necessary for carrying into execution the designs of the French court. In the directions given to his son before his death, he spoke of his correspondence with the most powerful and ambitious men in France; "a correspondence," said he, "very dearly bought, and arising out of the weakness of the then reigning king, by means of civil wars kindled on account of religion, and which I had revived by means of the ecclesiastics in my pay; having in all these designs employed thirty-two years of my life, and consumed more than six hundred million ducats in extraordinary expenses, passing under my own knowledge, and of which you will find the particulars in my secret cabinet, written with my own hand." Thus the manœuvres of the King of Spain, who died in 1598, having lasted, by his own confession, thirty-two years, must have commenced in 1566, just after the period of the famous interview at Bayonne, suggested by Pope Pius the Fourth, at which the Duke of Alva, on the part of the King of Spain, met Catherine de Medicis and Charles on the subject of the deliverance of the country from the Protestant party. Thus, after all, it appears likely that the court of France played but a secondary part in this affair, and that while Catherine and her son were indulging the cruel propensities of their nature, they were at the same time seconding the political views of Rome and Spain, and deriving advice from the one and pecuniary assistance from the other.

King Charles it is certain reaped nothing from the massacre but grief and remorse, and the indignation of al. right-minded persons. He died in two years after the massacre, amidst the most dreadful sufferings of body and mind. He raved of blood and murders, of the wicked counsel he had followed, and of the doom which awaited him; and expired on the 30th of May, 1574. Nor was it only on the approach of death that he experienced these emotions of dread and remorse. His surgeon, Ambroise Paré, who, although a Huguenot, was spared by the king on account of his superior skill, was witness to similar emotions soon after the massacre; for Charles confessed to him that he felt as if in a high fever, and that the figures of the murdered people, with their faces smeared with blood, seemed to start up before him every moment, both when he was awake and asleep. The occurrence of these transient fits of remorse has been the cause of some differences of opinion as to the share really borne by the king in these proceedings; but of these differences of opinion we have already spoken.

Catholic and Protestant writers of the time of the Bartholomew, and of succeeding days, have generally described this butchery of their fellow creatures in terms of indignation and horror, but there were some who could be found at that period, as there are at the present time, to palliate, to defend, or even to justify these massacres. Such persons must surely have allowed party feeling to blind their judgment to an extraordinary degree; and if they are attached to the faith of the Roman Catholic Church, their opinions afford small evidence of that change from a persecuting to a mild and tolerant spirit, which we frequently hear ascribed to Roman Catholics of the present day.

Having thus noticed some of the occurrences of that eventful period, which witnessed the treacherous and cruel conduct man is capable of, and the scenes of blood in which even females can delight, we may now furnish an account of a remarkable escape from the massacre, which will perhaps give a better notion of the strictness of the search after Protestants, and the thirst for their blood which prevailed at the time, than any remarks of a more general nature.

Philip de Mornay, (for whose interesting biography in

* *The Massacre of St. Bartholomew, with a concise History of the Corruptions, Usurpations, and Anti-social Effects of Romanism.* By SIR WILLIAM S. R. COCKBURN, BART. A.M.

MEDAL STRUCK BY POPE GREGORY XIII., IN COMMEMORATION OF THE MASSACRE OF FRENCH PROTESTANTS ON THE FEAST OF ST. BARTHOLOMEW, 1572.

our own language we are indebted to the Rev. Mr. Hone*,) who afterwards distinguished himself as a soldier, a politician and an author, was at the time of the Massacre of St. Bartholomew, in his twenty-third year. He had travelled over great part of Europe, and was well known for his zeal in the Protestant cause. At the time of the attempt on Coligny's life, he was on the point of leaving Paris for his country residence, but as soon as he heard of this mournful event, he delayed his departure, determined to stand by his old friend, and abide the fate of the Protestants in Paris. He hired apartments in the Rue de Bétizy, but was not able to take possession of them immediately. While they were being prepared for his reception, he remained at the Rue St. Jaques, and it was on his return from a visit to the admiral, to his rooms in the latter street, late on the evening of the 23rd, that he discovered symptoms of the approaching tumult. At five o'clock in the morning he despatched a servant to gain further intelligence, and soon learnt in what a dreadful state affairs now were. He began to prepare for leaving the city, but before he could dress himself, the street was filled with people, and the work of massacre going on on all sides. His landlord was kindly disposed towards him, and concealed him, while the house was searched by a party who came in pursuit of him. During the rest of the day, they were allowed to remain unmolested, for the master of the house was a Catholic, and the murderers having sought in vain for his lodger, proceeded with their work in other directions. On the following morning, however, they returned and commenced the pillage of a house adjoining that in which De Mornay was. The landlord then advised his departure, and accordingly De Mornay contrived to pass through the mob, without being observed. He walked through two or three streets, every moment in great danger of being detected, till he came to the house of an attorney named Girard, who had formerly been employed by his family in the management of their affairs. Owing to the prudent management of Girard, who easily comprehended the danger he was in, he was instantly admitted, as if a member of the family, and placed at a desk in the office, among the clerks employed there. Some friends of De Mornay, however, having guessed at the place of his retreat, came to beg for protection also, and this increase of visitors having attracted the attention of those who were on the watch for everything that might lead to the detection of Protestants, an order was received by Girard to deliver up the persons concealed in his house. De Mornay, thus driven from his place of shelter, once more escaped from the house and intermingled with the populace, without knowing what step to take. A person who had formerly been in his service, happened to recognise him, and offered to get him out of the city by the Porte St. Martin, where he was known to the guard. De Mornay gladly accepted his offer, but disappointment awaited him here, for an order had been issued, to prevent the opening of the gate that morning. They now repaired to another gate, and were actually permitted to pass, De Mornay having assumed the character of an attorney's clerk going to spend the vacation at Rouen. They had not long passed the gate, however, before the person on guard, remembered that they were not dressed as if intending to take so long a journey as to *Rouen*. He therefore despatched four armed men after them, who soon overtook and brought back the unfortunate pair. The mob became so violent at the attempted escape of the fugitives, that they dragged De Mornay along with the intention of throwing him into the river. His presence of mind was not shaken by this treatment. He coolly told them that they would repent of their conduct another day, when they found that they had drowned an innocent person in mistake for a guilty one, and that it was only for them to take him into some house, and he would give them such references to people in the city, as should convince them that he really was what he appeared to be. This conduct had its effect; the populace had still sufficient forbearance to *wish to shed* only Huguenot blood, and they therefore complied with his request. But now that he had gained his point, he was almost as much at a loss as ever.

He at first thought of trying to escape by the window of the room in which they had placed him, but knowing that this would be a vain attempt, he gave them the names of two persons of importance to whom he knew they could not gain access. But they were not to be thus easily satisfied; they required other references, and De Mornay sent messengers, with an open note to Girard, which ran thus: "Sir,—The people of the Porte and Faubourg of St. Dennis detain me here, and will not believe that I am Philip Mornay, your clerk, to whom you have given leave to go to Rouen to see his relations. Please to convince them of the truth of this statement, that I may proceed on my journey." The attorney on receiving this note, assumed an air of much importance, blamed the people for detaining his clerk, and wrote on the back of the paper the certificate required, with the assurance that his clerk was neither a rebel nor a seditious person. The two men were quite convinced by the words and by the manner of *Girard*, that they had been in the wrong, and when they *told* their comrades the particulars of their visit to the attorney, De Mornay was not only set at liberty, but was escorted by some of those who had previously been so bitter against him, to the outskirts of the city. After many other perils and escapes, he arrived at his estate in Normandy, but even there he found no place of safety, and accordingly he embarked at Dieppe for England, where he arrived on the ninth day after the massacre.

* *Lives of Eminent Christians*, by the Rev. RICHARD HONE, Vicar of Hales Owen. Three vols.; published under the direction of the General Literature and Education Committee of the Society for Promoting Christian Knowledge.

END OF THE FIFTEENTH VOLUME.

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